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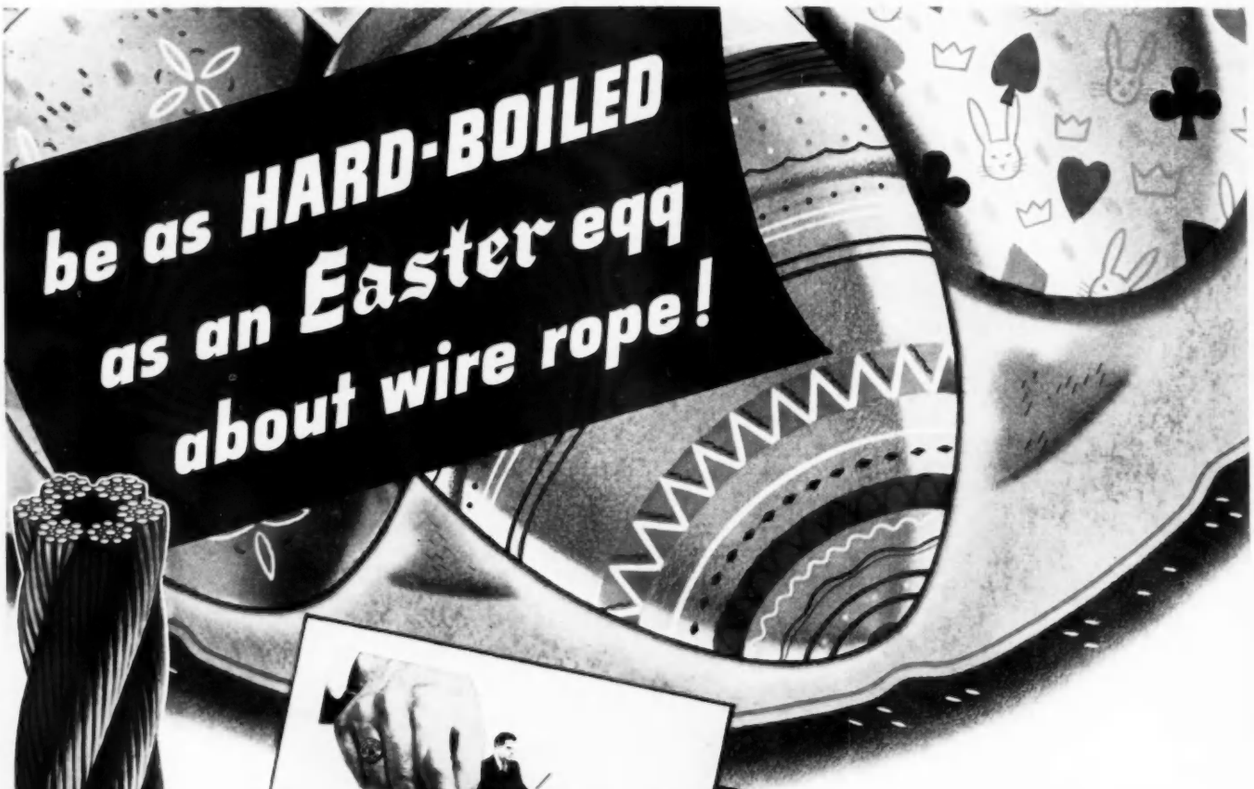

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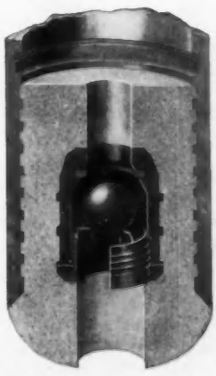

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LOOKING AHEAD

WITH THE EDITOR

A Number Reviewing Twenty-Five Years of Progress in Geology.

IT IS extremely fitting that the next issue of THE OIL WEEKLY should be devoted to petroleum geology and affiliated sciences, for the twenty-fifth annual meeting of the American Association of Petroleum Geologists rounds out a quarter of a century of progress and achievement.

Scientific oil finding has played a prominent part in the rise of the oil industry, for if it had not been possible to discover sufficient volumes of supplies to match ever-increasing consumption demand, other means of transportation, lubricating and heating would need to have been developed. Consequently, the industry is indebted to geology.

Outstanding contributors have been obtained for THE OIL WEEKLY's special A.A.P.G. number. Among the writers are: Henry A. Ley, president of the association; E. A. Eckhardt, president of the Society of Exploration Geophysicists; Marcus Hanna, past president of the Society of Economic Paleontologists and Mineralogists; Paul Weaver, first president of the Society of Exploration Geophysicists; B. B. Weatherby, a former president of the Society of Exploration Geophysicists; and others.

A staff article reviews the growth of the association through its 25 years, giving pertinent biographical data on the officials who have guided the A.A.P.G. and associated societies.

Pictures from some treasured albums also are presented to help effectively portray how far the science of geology has progressed.

The OIL WEEKLY, Published every Monday. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879.

THE OIL WEEKLY

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The Oil Man's Calendar

APR. 9–11	Society of Exploration Geophysicists, Chicago.
10–12	American Association of Petroleum Geologists, Chicago.
–11	Society of Economic Paleontologists and Mineralogists, Chicago.
	Petroleum Fluid Metering Conference, Petroleum Division, A.S.M.E., Norman, Okla.
11–12	American Petroleum Institute, Eastern District, Division of Production, Columbus, Ohio.
16–18	Southwestern Gas Measurement Short Course, Norman, Okla.
18–19	National Petroleum Association, Semi-Annual Meeting, Cleveland, Ohio.
26–27	Petroleum & Natural Gas Conference, State College, Pa.
MAY 1– 3	Petroleum Industry Electrical Association, Dallas, Texas.
6–10	American Gas Association, Natural Gas Section, Houston.
15–17	Natural Gasoline Association of America, Tulsa.
18–25	International Petroleum Exposition & Congress, Tulsa.
27–31	American Petroleum Institute, Mid-Year Meeting, Ft. Worth, Texas.
30–31 June 1	National Oil Scouts and Land Man's Association, Hot Springs, Ark.
JUNE 1	Illinois-Indiana Petroleum Association, Robinson, Ill.

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Published every Monday. Single Copies 15 cents (Special Issues 50c). Subscription price: domestic and foreign, $2.00 a year; 2 years $3.00. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879. Subscription restricted to those engaged in the producing and pipe line branches of the oil industry or the manufacturing and distribution of oil field supplies. Advertising rates on application.

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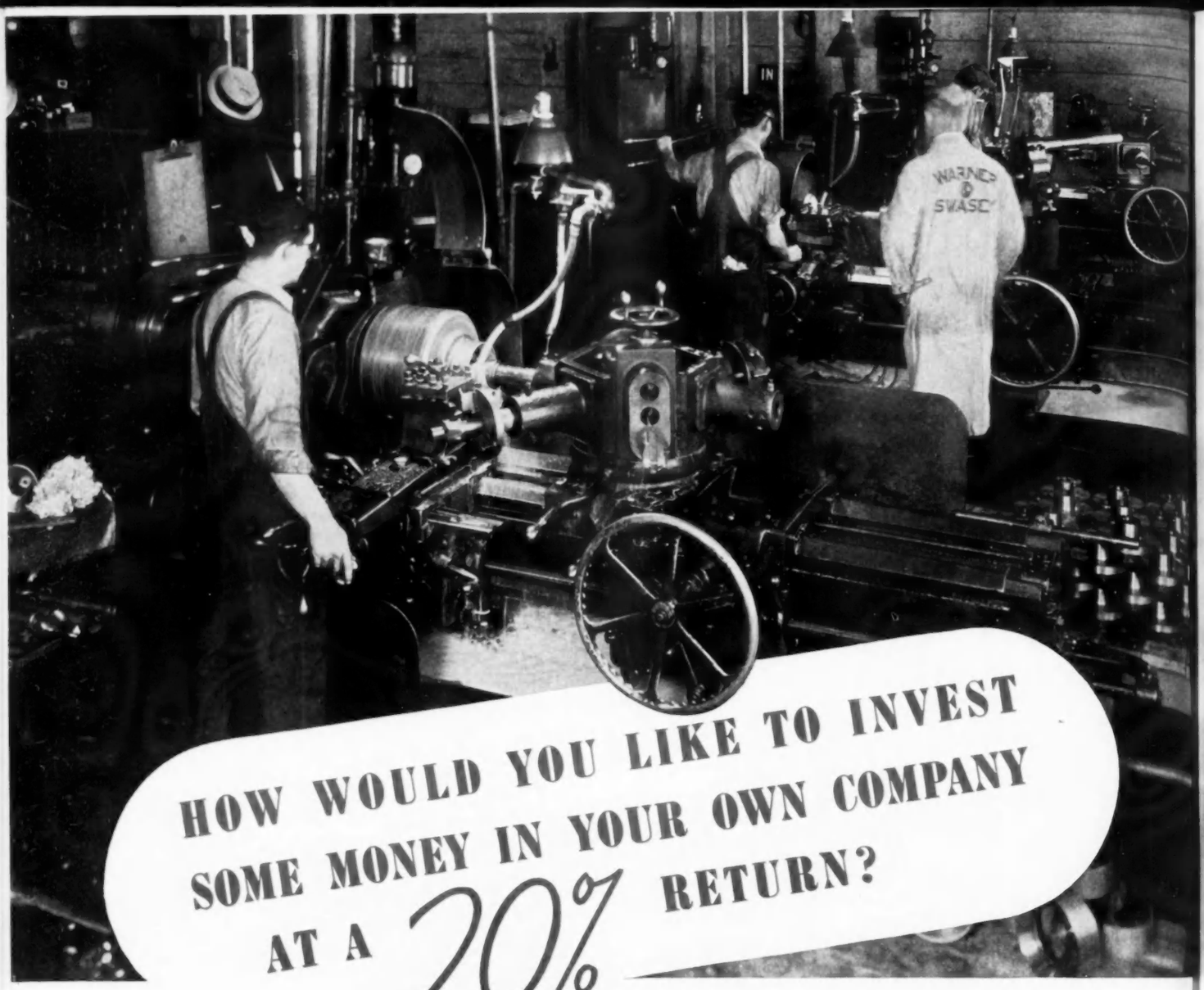

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THE OIL WEEKLY

APRIL 1, 1940

VOLUME 97 NUMBER 4

The Week's Panorama

MORE moderate production of crude oil is in prospect, under stricter allowables for April, and to that extent, the industry's markets have been strengthened. But record gasoline stocks remain.

Gasoline Surplus . . . . . .

The Lamp, house organ of Standard Oil Company of New Jersey, has pointed to high gasoline stocks as a serious problem. "So large a volume (in storage) naturally exerts a depressing influence not only on the gasoline market but on crude prices as well," the magazine stated, "since it is axiomatic that no refiner can afford for long to pay more for his raw material than he can realize from the sale of the many products made from it."

Basic Problem Involved . . .

Taking a long-range view, The Lamp commented further on gasoline stocks and their relation to sharply increasing consumption of heating oils. "There is every prospect," stated the house organ, "that with the steady growth of domestic and commercial oil burner installations, demand for distillate fuel and gas oils will continue to rise. In looking to the future, therefore, the industry's problem lies in meeting increasing and sometimes unexpected demands for distillate fuel and gas oils without unnecessarily adding to gasoline stocks in winter."

Earnings in 1939 . . . . . .

Despite the sharp improvement in earnings in the final quarter of the year, the oil industry's profits in 1939 did not compare well with all businesses in the aggregate.

A group of nearly 500 companies in a score of different lines earned over 75 percent more in 1939 than in 1938. But 20 oil companies showed an aggregate increase of only 20 percent in profits.

Noteworthy improvement in results was shown by the steel, automobile, textile, building supplies, chemical, rubber goods, shoe manufacturing, packing and machine tool industries.

Rainbow of Oil . . . . . .

The limits of United States oil reserves begin to appear like the rainbow's end. The country consumed 1¼ billion barrels of petroleum in 1939, but at the end of the year there was a billion barrels more oil in sight than at the beginning, discoveries of the year having been nearly twice the quantity taken from the ground.

The American Petroleum Institute's committee on petroleum reserves last week reported that there was a net increase of 1,134,866,000 barrels in known underground stocks of petroleum in 1939, after deduction of the 1,264,256,000 barrels produced. The proved reserve inventory stood on January 1, 1940, at a new peak of 18,483,012,000 barrels.

Federal Control . . . . . .

Among the many in the oil industry who oppose the Cole bill for federal control, there is belief that the proposed legislation will not be enacted into law.

Rich in Roads . . . . . .

For building and maintaining roads and highways since 1913, motorists in the United States have spent, through gasoline and other automotive taxes, over $15,000,000,000, according to the American Petroleum Industries Committee. That sum is 2½ times the current value of the 30,000,000 motor vehicles operating on the nation's highways and is equivalent to the world's gold reserves at the old price of $20.67 an ounce. . . . . However, the road and highway system could be rebuilt three times for the equivalent of the present national debt.

Now rich in roads, the country has over 385,000 miles of surfaced roads in the state highway systems and many additional miles of good roads in the secondary and county systems, not to mention local roads improved through grading, draining, and oiling.

The $15,000,000,000 plus raised for roads has consisted of $8,000,000 paid to states in gasoline taxes, $1,250,000,000 in federal gasoline taxes, $5,800,000,000 paid to states in registration and other fees, and $750,000,000 in federal taxes on lubricating oil, new motor vehicles, and accessories.

TNEC Testimony Published . .

Being published in 7 volumes are the testimony and statements last fall of all witnesses at the petroleum industry hearings of the Temporary National Economic Committee, sometimes called the Monopoly Committee. The set of books is expected to sell for about $5, and orders should be sent to James R. Brackett, Temporary National Economic Committee, 281 Apex Building, Washington.

Charcoal in Lieu of Oil. . . .

The Italian State Railways soon will put into regular service three trains in which motors are fueled by gas generated from charcoal rather than by gasoline or fuel oil. Each train, with passenger capacity of 76, is equipped with two 1400 horsepower motors, into which gasogene is fed from two tanks in the center of the engine. On a test run of 94 miles, one of the trains averaged 65 miles an hour and consumed 440 pounds of charcoal.

Causes and Preventions of Stuck Drill Pipe

By J. E. WARREN, Carl B. King Drilling Company, Dallas, Texas

Part 1

THE author discusses various factors that may cause drill pipe to stick in the well bore, these including key seating, improper mud control, cuttings, sand, cavings, and "balling up," and gives recommendations for preventing stuck drill pipe, for freeing and recovering the pipe when stuck under cited conditions.

This paper was presented at the Spring Meeting of the Southwestern District, American Petroleum Institute, Division of Production, Houston, Texas, March 28-29, 1940, titled "Causes, Preventions and Recovery of Stuck Drill Pipe." The statements and opinions expressed herein are those of the author, and should not be construed as an official action or opinion of the Institute, nor of this publication.

DURING the past few years, field experience and technical investigation have increased our knowledge concerning the causes and cures for fishing jobs. Marked progress has been made in the metallurgy and design of both surface and sub-surface equipment for drilling rotary wells. Noteworthy advances have been made in the technique of drilling, resulting in straighter holes and a better understanding of the properties of drilling mud and their application to field conditions. This improved technique has greatly reduced the hazards of fishing, and many jobs that were common only a few years ago have been reduced to insignificance. However, with the advent of deeper drilling, smaller-diameter holes and increased capacity for higher rates of penetration, new and different hazards have come into being. The expense of fishing jobs is still an appreciable percentage of the total cost of drilling wells.

A comprehensive paper by J. T. Hayward presents the only detailed published information on the subject of stuck pipe[1]. The purpose of this paper is to add to and expand some of the things brought out by Hayward. Blow-outs, heaving shale, mechanical failure of equipment and loss of returns are causes that stick pipe. These causes are associated with unusual conditions that are beyond the scope of this paper.

Almost every fishing job presents special problems and the judgment exercised by the operator in his analysis is most important in reaching a successful conclusion of the job. Among the many factors which must be considered are appraisal of the hole conditions, the "fish" with relation to the hole, and methods of recovery. In the case of a difficult fishing job, it is often less costly to sidetrack the fish or even abandon the hole rather than continue fishing. Fishing tools such as overshots, taps and baskets are generally carried as equipment by the average operator. Special tools used for fishing jobs of a complex nature are handled on a rental basis by fishing tool companies. These companies employ men who are trained and experienced in the proper use of the various special tools. However, the judgment of the operator prevails in making any decision as to the procedure to follow. There is an old axiom in the oil industry that "a fishing job is not generally bad until made so." This is true in a number of cases and the factor of judgment has an important place in the final cost of successfully concluding the job.

Many operators deliberately assume risk which may result in a fishing job because the additional savings effected by assuming these hazards are justified. Some notable examples of these are:

1. Cutting down the hole size to accommodate smaller casing.
2. Shortening the length of surface casing.
3. Elimination of protection strings of casing.

A certain percentage of fishing jobs are preventable by changing the drilling procedure; in these cases the cost of preventing fishing jobs is greater than the probable cost if the hazard is assumed.

Drill stem may become frozen or stuck due to a number of reasons. Some of them are peculiar to certain areas and to certain formations. In general, more trouble is experienced during the early drilling of an area than after a year or two of experience. This has been due to locating the peculiar hazards and eliminating them by changing the drilling technique. It has come to the attention of the writer that trouble sometimes runs in cycles in some areas. It has been noticed that a good many fishing jobs would be in progress at one time and then for a period there would be a lack of trouble. Supervision and personnel probably become somewhat lax in taking precautions necessary to prevent trouble after a continued drilling period free of fishing jobs.

Causes of Stuck or Frozen Drill Stem

The causes of stuck or frozen drill pipe are many and often a combination of causes may be responsible. The common causes may be divided as follows:

1. Key seating.
2. Improper mud control.
3. Cuttings, sand and cavings.
4. Balling up.

Many cases of stuck drill pipe

[1] "Cause and Cure of Frozen Drill Pipe and Casing" by J. T. Hayward, Mid-Year Meeting, American Petroleum Institute, Colorado Springs, Colo., June 2, 1937, **Drilling and Production Practice,** 1937, Page 8.

could have been avoided by proper diligence on the part of the driller. A good many strings of pipe have been stuck through negligence. The driller should always carefully consider the possibility of sticking the pipe if it is necessary to shut down the rig. If repairs are necessary that will not permit the rotation of the pipe, it is good practice to elevate the drill pipe off bottom, so that it can be lowered at frequent intervals.

Key Seated Holes

During drilling operations the lower portion of the drill stem is in compression and the upper portion in tension. A neutral point necessarily exists where the drill pipe in compression changes to a state of tension. The location of the neutral point varies with the weight carried on the bit and the weight of the drill assembly and drill pipe. It is considered good practice, when possible to do so, to design the drill assembly so that this neutral point is below top of the drill collar. Where this is done, all the drill pipe above the drill collar is in tension. The amount of tension progressively increases upward through the drill pipe to the swivel. If, in drilling a well, the hole deviates from the vertical, and on continued drilling, this portion of the hole is opposite drill pipe in tension, a definite pulling action is exerted by the drill pipe on the wall of the hole. This pulling action combined with the circulation of drilling fluid, broaching action of the tool joints and rotation of the drill pipe, results in a tendency for the drill pipe to drill itself into the wall of the hole. Figure 1 shows diagrammatically a section of crooked hole illustrating the pulling action of the pipe and the broaching action of the tool joints on the wall of the hole. The extent of the crook is exaggerated for illustrative purposes. The extent of the key-seating effect is a product of the tension in the drill pipe, character of the formation, nature and amount of the curvature of the hole, and the amount of time that the action proceeds. Figure 2 shows the position of the pipe after the key seat has been formed. Shales and soft formations afford conditions suitable for key seating, but the action has been known to take place in comparatively hard formations. Extreme cases of key seating have been observed where the drill pipe was stuck outside the periphery of the drilled hole.

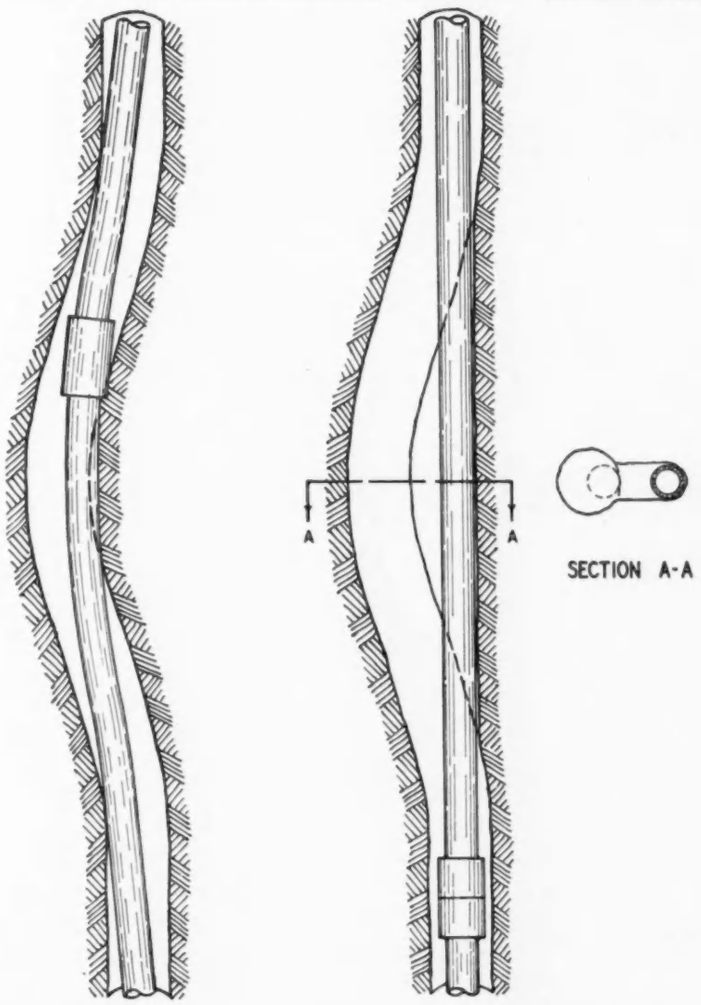


FIGURE 1
Illustrating Keyseating Effect on Crooked Hole.

FIGURE 2
Position of Pipe after Keyseating

The hazard of key-seated holes has increased since the practice of drilling deeper wells has become general. One operator of a large fishing tool concern expressed the opinion that most of their jobs involving stuck drill steam were due to key seating. While it is difficult to evaluate the influence of key seating as a reason for stuck drill pipe, it is the writer's opinion that it is probably the most important single reason in the case of deeper wells.

Straight holes do not key seat and if wells are drilled nearly vertical, trouble from this source will be minimized. Since the size of the key seat is large enough to accommodate the tool joints, any trouble experienced is generally due to the "hanging" of the bit or drill collar. The tendency for pipe to stick in a key seat is greatest while pulling the drill stem out of the hole. Since pipe becomes stuck by pulling up in a key seat, it is always best to work the drill pipe downward as pulling up will result in sticking the pipe much tighter. Figure 3 illustrates how drill pipe is stuck by pulling drill collars into a key seated hole.

If it becomes apparent that a key seat is forming, it is good practice to keep it reamed to the diameter of the drilled hole. The usual procedure is to run a reamer in the drill stem located at a point above the key seat when the bit is at the bottom of the hole. Blade reamers are used for this purpose in soft formations, but it is necessary to use roller reamers in harder formations. Figure 4 shows the action of the reamer enlarging the key seated hole to the diameter of the drilled hole. It is important that the reamer be started above the key seat in order to prevent the formation of a shoulder. If the key-

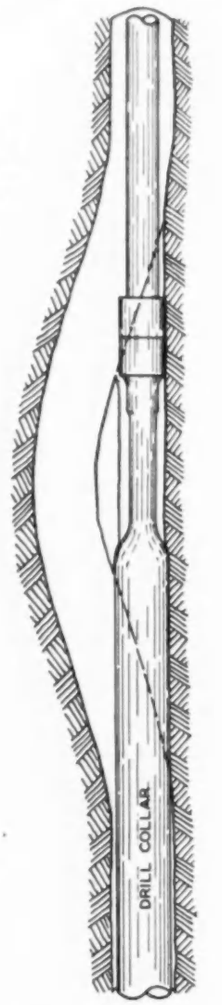


FIGURE 3
Drill Collar Stuck in Keyseat

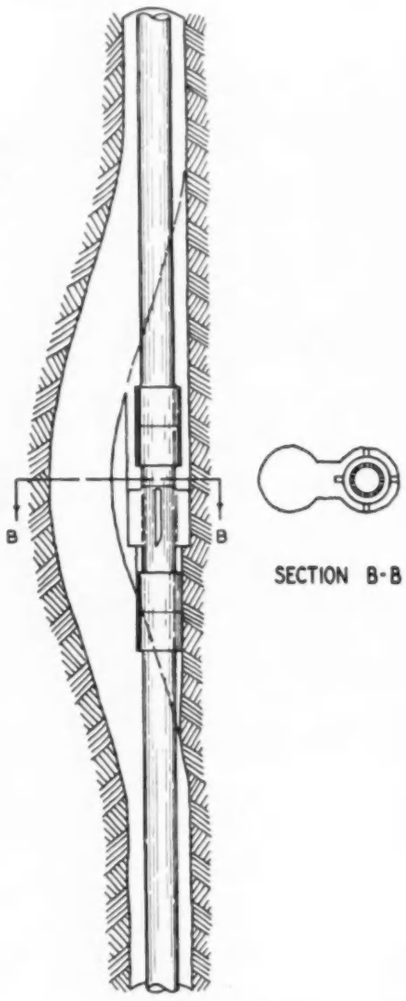


FIGURE 4
Reamer Action in Enlarging Keyseat

seated condition has become so hazardous that it is inadvisable to ream while drilling, then the procedure is to underream the portion of the hole giving trouble. A type of underreamer should be used with a drill-pipe connection on the lower end. Sufficient drill pipe is added below the underreamer, so that the same pulling effect that formed the key seat will be applied to the underreamer. Tapered drill collars are particularly hazardous in a key-seated hole. The wedging action of the taper often will stick the drill collar so tightly that it can not be spudded or rotated loose. One Gulf Coast operator installs a substitute on top of the drill collar which has a diameter equal to the largest diameter of the tapered drill collar. The substitute has a square shoulder which prevents the tapered portion of the drill collar entering and wedging in a key seated hole.

Pipe Stuck Due to Improper Mud Control

Hayward brought out in his paper the necessity of having sufficient gel-forming colloids in the mud to form a proper carrier for sand and cuttings and also act as a suspending agent, to prevent solids settling, in the event circulation is stopped.

Admixtures to increase mud weight, even if ground to extremely fine dimensions, will settle and stick pipe if the mud is deficient in gel-forming colloids. It is important that a proper amount of gel-forming colloids be added to weighted mud in order that a state of suspension will be maintained if circulation is stopped.

Most formations are to some extent porous, allowing the loss of water from the mud to the formation. The tendency of drilling mud is to build a wall in the hole to resist this action. The loss of water filtrate is proportional to the thickness of filter-cake wall deposited in the hole.

Filtration characteristics exhibited by drilling mud have a definite relation to stuck drill pipe. The water filtrating into a formation may start a caving or sloughing condition. Also the deposition of filter cake on the walls of a hole results in reducing the drilled diameter by double the thickness of the filter cake. These conditions may result in sticking drill pipe and are very often the reason for sticking casing. Filtration of drilling mud increases (with increased depths) due chiefly to the increased temperatures encountered at greater depths. Filtration experiments made on drilling mud show that the thickness of filter cake and the amount of water filtrate into the formation are influenced by the following factors:

1. The quality of mud is very important. Poor mud will develop a very thick filter cake.
2. Increased temperature increases the amount of filteration and thickness of filter cake.
3. The time that porous formation is exposed to filtration conditions. The thickness of the filter cake will increase with length of time.
4. Pressure to a much lesser degree than temperature has an effect in increasing the thickness of filter cake.

Since temperatures increase with depth and also pressure, the problem of filtration becomes more important in deep drilling operations. Temperatures in excess of 200°F. are encountered in the deep wells being drilled today. The effect of temperature increased from 80°F. to 200°F., has increased filter-cake thickness as much as 150 percent. The effect of temperature on filter cake thickness is illustrated in Figure 5 and Figure 6. These pictures also illustrate the effect of mud quality in the deposition of filter cake. Mud while circulating is below formation temperature, but assumes formation temperature when circulation is stopped. Control of temperature and pressure is limited and filtration problems must be solved by changing the quality and character of the mud. The addition of gel-forming colloids to mud which is uncontaminated with salt is very effective in reducing the amount of filter-cake deposition. In areas where mud is contaminated with salt water, special colloidal admixtures have been

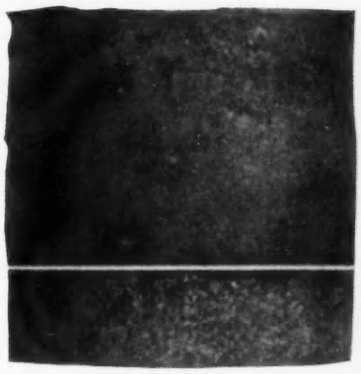


FIGURE 5

Filter Cakes (above white lines) deposited by low colloidal content mud. One at left at 80° F.—one at right at 200° F.

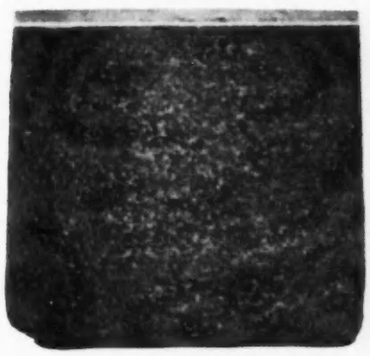


FIGURE 6

Filter Cakes (above white lines) deposited by high colloidal content. One at left at 80° F.—one at right at 200° F.

helpful in reducing the amount of filtration.

Cuttings, Sand and Cavings

Well bores are not uniform in diameter throughout their vertical length. Caving, washouts and solution of soluble formation increase the well diameter at the points where the action occurs. The velocity of the circulating mud is reduced at points where the hole is larger than the drilled diameter. The reduction in velocity will allow some of the solid in the mud stream to settle out and accumulate at these points. These solids are kept agitated and buoyed up while circulation is maintained, but will settle downward and bridge around the drill stem if circulation is stopped. Tool joints restrict the annular space, and form perfect places for bridging and accumulation of settling solids. Since accumulation is likely to form on the top of tool joints, upward movement of the drill pipe will have a compacting effect and result in sticking the pipe. Large cavities in a well complicate the fishing for drill pipe which must be recovered in sections. Cavities allow the top of a drill-pipe fish to lean over out of the original well bore.

The prevention of trouble originating from cavings, sand and cuttings can be minimized by proper mud conditioning. The design of mud pits, use of a shale shaker and addition of gel-forming colloids are effective in preventing the formation of cavities.

Pipe stuck while circulation is maintained may be due to the screening effect of a bridge, resulting in the accumulation of sand and other particles below the bridge. As circulation is continued the bridge grows downward as more and more particles are screened out of the mud. Shutting down the pumps and relieving the pressure or alternately starting and stopping the pumps have been effective in freeing pipe stuck from this cause. When circulation is stopped the lowermost portion of the bridge, which has been held up by pressure, melts away. The decaying of the bridge continues until the pipe is free. If alternately stopping and starting the pumps will not free the pipe, pinching the pump suction and creating a water hammer may be effective. It is recommended that tension should be pulled in the pipe in conjunction with the intentional use of water hammer$_1$.

Balling Up

Balling up refers to the accumulation of sticky mud or formation on the bit or drill assembly. On withdrawal of the drill stem this accumulation is compacted and may stick the pipe.

Trouble from balling up has been experienced where high rates of penetration are possible, particularly while drilling at shallow depths. It is thought that the cuttings are not completely hydrated into mud and large chunks may accumulate while drilling progresses.

Balling up may occur as a result of the accumulation of filter cake on the bit or drill assembly while pulling the drill stem out of the hole. Proper conditioning of the mud and increasing the capacity of the circulating system is effective in eliminating trouble caused by balling up.

END OF PART 1

Part 2, which deals with methods of recovering stuck drill pipe, will appear in the issue of April 15.

More and Deeper Wells Are Being Drilled in 1940

By L. J. LOGAN, Associate Editor

THE industry is drilling more and deeper wells this year, and in consequence, footage involved is materially greater.

In the first three months of 1940, completions were 11.6 percent more numerous than in the corresponding months of 1939, but because of greater average depths, 21.8 percent more footage was drilled.

Although wells have been shallower on the average in 1940 than in 1939 in some states and districts, they have been deeper in more than half the major districts, including some of the especially active areas. And for the country as a whole, the average drilling depth in the first quarter of 1940 was the greatest in the history of the industry.

The wells that were completed during the first three months of 1940 averaged 3194 feet in depth. That was 192 feet or 6.4 percent more than the average of 3002 feet for all the wells completed in 1939 and exceeded by 266 feet the average for the first quarter of 1939, last year's average having been pulled down as the year progressed, through the pick-up of drilling in Illinois, Pennsylvania, and some other active areas of relatively shallow depths.

Average Drilling Depth Shows Increase This Year

YEAR	Wells Completed	Footage Drilled	Average Depth per Well
1925	25,406	73,677,400	2900
1926	28,995	81,186,000	2800
1927	22,301	66,903,000	3000
1928	19,964	59,892,000	3000
1929	23,463	67,925,285	2895
1930	19,848	57,557,200	2900
1931	11,716	34,259,110	2924
1932	14,290	43,033,422	3011
1933	12,170	36,904,500	3032
1934	18,949	51,748,906	2731
1935	22,669	64,112,400	2829
1936	26,935	77,071,920	2861
1937	33,112	99,922,908	2974
*1938	28,272	87,497,152	3095
1939	27,550	82,711,156	3002
First 3 Months			
1939	6,180	18,092,912	2928
1940	6,892	22,031,501	3194

* Revised.

The 3194-foot average depth of the first quarter of 1940 was nearly 100 feet greater than that of 3095 feet for wells completed in 1938—the all-time record up to this year.

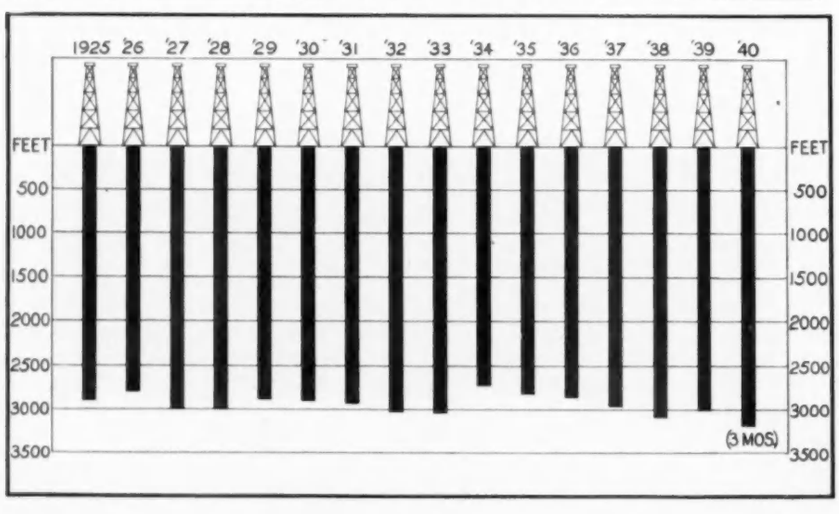
Whereas Illinois last year exerted a strong influence toward a shallower average depth for the nation, that influence has diminished this year for two reasons: fewer completions in the state and deeper drilling involved in the development of the Devonian pay zone. In contrast with the average of 1964 feet for all of 1939, Illinois completions were 2478 feet deep, on the average, in the first three months of this year. Consequently, despite the fact that the state furnished 6.5 percent fewer completions in the initial quarter of 1940 than in the similar period of 1939, it accounted for 31.7 percent more footage, the combined depths of wells completed having gained from 1,519,696 to 2,002,707 feet.

California is another state that is exerting an important influence toward increasing the average drilling depth of the nation. In 1940 the state has maintained development a little above last year's levels and new wells have been materially deeper, the state average having jumped from 5592 feet for all of 1939 to 7283 feet for the first quarter of 1940. Consequently, California operators drilled 40.6 percent more footage in the first three months of this year than in the corresponding months of last year, or 1,835,552 feet, against 1,304,119.

Other states and districts that have furnished both more and deeper wells, and therefore more footage, this year have included: Indiana, Michigan, Pennsylvania, West Virginia, Montana, Wyoming, Kansas, North Texas, West Texas, West Central Texas, and the Laredo district of Southwest Texas.

Several areas had more completions in the first quarter of 1940 than in the similar period of 1939, and because of the increased num-

Average Drilling Depth in United States, by Years



Footage Drilled and Average Depths Greater Than in 1939

STATE OR DISTRICT	COMPLETIONS[1] 1939 1st Quarter	COMPLETIONS[1] 1940 1st Quarter	COMPLETIONS[1] Percent Change	FOOTAGE DRILLED 1939 1st Quarter	FOOTAGE DRILLED 1940 1st Quarter	FOOTAGE DRILLED Percent Change	AVERAGE DEPTH 1939 Entire Year	AVERAGE DEPTH 1940 1st Quarter	AVERAGE DEPTH Percent Change
Arkansas	56	44	— 21.4	327,585	267,607	— 18.3	6042	6082	— 0.7
California	241	252	+ 4.5	1,304,119	1,835,552	+ 40.6	5592	7283	+30.3
Colorado	6	1	— 83.2	20,939	1,500	— 93.0	3890	1500	—61.5
Illinois	864	808	— 6.5	1,519,696	2,002,707	+ 31.7	1964	2478	+25.7
Indiana	30	86	+ 186.7	41,261	193,156	+ 371.0	1700	2246	+32.1
Kansas	284	353	+ 24.2	890,346	1,126,672	+ 26.7	3062	3191	+ 4.2
Kentucky	149	52	— 65.0	227,132	57,679	— 74.8	1373	1109	—19.2
Louisiana	223	338	+ 54.0	1,064,121	1,999,433	+ 87.9	5632	5915	+ 5.1
North Louisiana	92	122	+ 32.6	337,363	306,187	— 9.2	3840	2509	—34.2
South Louisiana	131	216	+ 64.8	726,758	1,365,729	+ 88.1	6395	6322	— 1.1
Michigan	270	315	+ 16.6	439,128	633,704	+ 44.2	1810	2011	+11.1
Mississippi	1	34	+3300.0	3,195	162,662	+4950.0	4898	4784	— 2.3
Montana	22	27	+ 22.7	48,151	69,103	+ 43.4	2083	2559	+23.0
New Mexico	138	180	+ 30.5	527,052	552,128	+ 4.7	3508	3067	—12.7
New York	[2]115	[2]262	+ 128.0	207,034	314,107	+ 51.7	1460	1198	—17.9
Ohio	[2]194	[2]212	+ 9.3	393,643	355,816	— 9.7	1927	1678	—12.9
Oklahoma	440	479	+ 8.9	1,205,074	1,336,500	+ 10.9	2961	2790	— 6.1
Pennsylvania	[2-3]390	[2-3]822	+ 110.5	727,483	1,749,468	+ 140.5	1703	2128	+24.9
Texas	2,485	2,448	— 1.5	8,690,620	8,863,715	+ 2.0	3698	3620	— 2.1
East Texas Field	191	75	— 60.8	749,260	276,439	— 63.2	3629	3685	+15.4
Rest of East Texas	66	59	— 10.6	287,237	260,285	— 9.4	4138	4411	+ 6.6
North Texas	367	546	+ 48.9	801,821	1,402,314	+ 75.2	2304	2568	+11.4
South Texas	702	637	— 9.3	2,723,995	2,439,784	— 10.4	3891	3830	— 1.6
Corpus Christi Area	312	283	— 9.3	1,863,853	1,556,206	— 16.5	5533	5498	— 0.6
Laredo Area	274	297	+ 8.4	656,038	773,135	+ 17.8	2535	2603	+ 2.7
San Antonio Area	116	57	— 50.8	204,104	110,443	— 46.2	1750	1937	+10.7
Texas Gulf Coast	366	294	— 19.6	2,071,691	1,673,114	— 19.2	6335	5690	—10.2
Texas Panhandle	80	138	+ 72.5	240,963	420,014	+ 75.0	3051	3043	— 0.3
West Texas	489	516	+ 5.5	1,687,161	2,045,889	+ 21.2	3549	3964	+11.7
West Central Texas	94	183	+ 94.9	128,492	342,876	+ 167.0	1588	1873	+18.0
West Virginia	138	148	+ 7.3	358,283	381,192	+ 6.4	2554	2575	+ 0.8
Wyoming	28	37	+ 32.1	98,050	128,800	+ 30.7	3304	3481	+ 5.3
Total United States	6,180	6,898	+ 11.6	18,092,912	22,031,501	+ 21.8	3002	3194	+ 6.4

[1] For the 13 week periods ended March 25, 1939, and March 23, 1938.
[2] Includes water-input wells.
[3] January and February totals revised in accordance with The Producers Monthly, organ of the Bradford District Pennsylvania Oil Producers Association.

bers of wells accounted for more footage, despite smaller average drilling depths. In that group were Oklahoma, the Texas Panhandle, New Mexico, South Louisiana, Mississippi, and New York.

On the other hand, North Louisiana and Ohio showed increases in completions, but because of shallower average depths accounted for less footage in the first quarter of 1940 than in the like period of 1939.

Decreases in both completions and drilling depths occurred in Kentucky, the Texas Gulf Coast, and the Corpus Christi area of Southwest Texas, and those areas consequently furnished less footage than in the initial quarter of 1939.

Eastern Texas furnished fewer completions, and despite somewhat greater depths of the new wells, accounted for less footage than in the first three months of last year.

Statistics on drilling in the first quarter of 1940 were featured by the emergence of California into a clear lead as the nations No. 1 deep drilling area. During the three months, 252 wells were completed in the state, and their depths aggregated 1,835,552 feet, an average of 7283 feet per well. In the similar period of 1939, nearly as many wells, that is, 241, had combined depths of only 1,304,119 feet, an average of 5411 feet per well; and for the whole year 1939, the average drilling depth in California was 5592 feet.

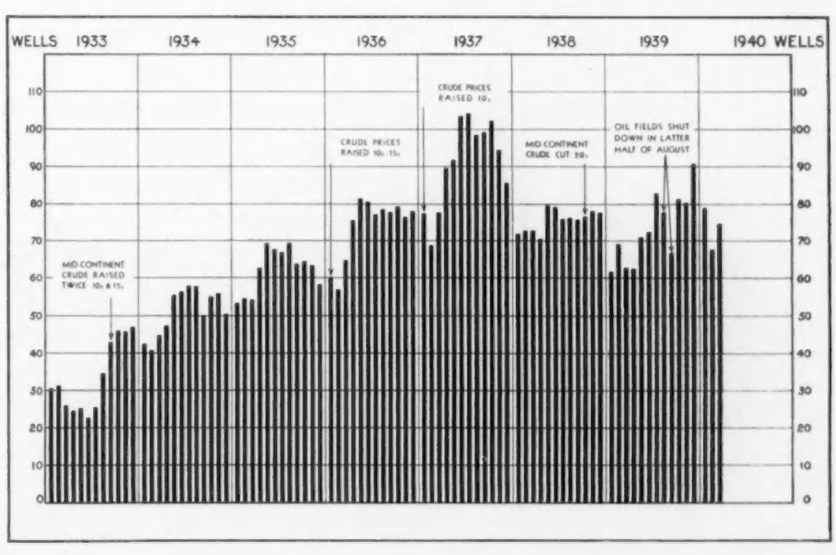
Numerous California fields now are producing from depths greater than 7000 feet. Each of the three major regions of the state, the San Joaquin Valley, the Los Angeles Basin, and the Coastal District, yields oil from depths of 7000 feet or greater, and several fields are productive below 10,000 feet. Especially conspicuous in the deep drilling picture lately have been new fields of the San Joaquin Valley. More than half a dozen areas in Kern County yield oil from depths of 8000 to more than 10,000 feet, among them being Belridge, Canal, Coles' Levee, Greeley, Rio Bravo, Strand, and Ten Section.

Although crowded out of first place by California, South Louisiana remains an outstanding deep drilling region. The district in the first three months of this year furnished 216 new wells that averaged 6322 feet in depth, as various exceptionally deep fields exerted their influence along with that of a considerable number of shallower fields. In South Louisiana, as in California, 10,000-foot wells no longer are unusual, various fields being productive below that level.

Next after the Louisiana Gulf Coast in deep drilling is the Texas Gulf Coast, where 294 new wells this year averaged 5690 feet in depth. However, that section of the Gulf Coast in 1939 showed an average drilling depth of 6335 feet. Completions in the area were nearly 20 percent fewer in the first three months of 1940 than in the corresponding months of 1939, and with the drilling depths smaller, footage drilled was down materially.

The Corpus Christi area of South Texas now ranks along with the Texas Gulf Coast both in completions and average drilling depths. The 283 wells completed there in the first quarter of 1940 had an average depth of 5498 feet. How-

Average Daily Well Completions in U. S., by Months



ever, both the number of completions and the average depth were smaller than in the similar period last year, and footage drilled was off considerably.

Arkansas also has continued to rate as a deep drilling district, the 44 wells completed there in the initial quarter of this year having averaged 6082 feet per well. In all of 1939 the average for the state was 6042 feet.

First Three Months

Completions in the United States in the first three months of 1940 totaled 6898, or 11.6 percent more than the 6180 new wells of the similar period of 1939. Toward the increase, all but a comparatively few areas contributed. Exceptionally large drilling gains of around 100 percent or more have occurred in Indiana, Mississippi, New York, Pennsylvania, West Central Texas, and the Texas Panhandle. South Louisiana has had 65 percent more completions this year than last year in the first quarter, and other important increases have included those 25 to 50 percent in Kansas, North Louisiana, North Texas, New Mexico, and Wyoming. Smaller gains have occurred in California, Montana, Michigan, Ohio, West Virginia, Oklahoma, West Texas, and the Laredo district of Southwest Texas.

Number of Rigs in Field Greatest Since 1937

STATE OR DISTRICT	TOTAL RIGS IN OPERATION Drilling, Rigs Up, Shut-Down				DETAILS OF APRIL 1, 1940 FIELD ACTIVITY					
					Rigs in Operation			Prelim. Activity		
	April 1 1940	March 1 1940	April 1 1930	Percent Change from Year Ago	Drilling	Rigs Up	Shut-down	Derricks	Locations	Total Operations
Alabama	2	1	4	— 50.0	1	....	1	....	....	2
Arizona	7	8	6	+ 16.3	5	....	2	....	1	8
Arkansas	44	31	35	+ 25.6	26	12	6	2	....	46
California	297	212	302	— 1.7	189	86	23	....	72	369
Colorado	30	30	22	+ 36.3	3	1	26	1	1	32
Florida	4	4	5	— 20.0	1	....	3	3	....	6
Georgia	....	3	....	....	....	....	....	....	....	....
Illinois	442	458	279	+ 58.2	369	40	33	20	72	534
Indiana	78	82	37	+ 110.9	26	8	44	....	12	90
Iowa	3	2	....	....	1	....	2	....	....	3
Kansas	283	222	179	+ 58.2	216	40	27	17	10	310
Kentucky	61	61	70	— 12.7	15	10	36	....	1	62
Louisiana	215	209	214	+ 0.5	191	16	8	10	48	273
North Louisiana	60	65	82	— 26.9	45	10	5	2	3	65
South Louisiana	155	144	132	+ 17.4	146	6	3	8	45	208
Michigan	199	178	163	+ 18.1	161	11	27	16	15	230
Mississippi	38	25	9	+ 323.0	22	8	8	4	2	44
Missouri	18	15	....	....	2	....	16	....	....	18
Montana	34	34	49	— 30.6	10	3	21	1	1	36
Nebraska	14	16	1	+1300.0	....	....	14	....	....	14
New Mexico	163	164	126	+ 29.3	119	6	38	....	19	182
New York	120	119	31	+ 287.0	83	25	12	1	3	124
Ohio	191	180	119	+ 60.4	117	44	30	10	10	211
Oklahoma	372	336	289	+ 28.7	271	40	61	52	33	457
Oregon	1	1	....	....	....	....	1	....	....	1
Pennsylvania	393	367	172	+ 128.5	287	86	20	10	10	503
South Dakota	1	1	....	....	....	....	1	....	....	1
Tennessee	3	6	....	....	2	....	1	....	....	3
Texas	1,261	1,279	1,203	+ 4.8	1,008	94	159	66	430	1,757
East Texas Field	15	11	5	+ 200.0	8	6	1	2	4	21
East Texas Border Co.'s	10	9	9	+ 11.1	6	....	4	1	....	11
Rest of East Texas	42	45	39	+ 7.7	25	5	12	3	3	48
North Texas	231	233	163	+ 41.7	168	12	51	11	131	373
South Texas	307	311	340	— 9.7	245	25	37	24	75	406
Corpus Christi Area	158	161	180	— 12.2	138	11	9	10	35	203
Laredo Area	84	86	95	— 11.6	61	12	11	9	27	120
San Antonio Area	65	64	65	....	46	2	17	5	13	83
Texas Gulf Coast	143	145	144	— 0.7	137	5	1	20	85	248
Texas Panhandle	104	112	77	+ 35.0	79	13	12	....	34	138
West Texas	298	310	342	— 12.9	269	10	19	5	58	361
West Central Texas	111	103	84	+ 32.1	71	18	22	....	40	151
Utah	3	4	1	+ 200.0	2	....	1	....	....	3
West Virginia	126	157	63	+ 100.0	96	18	12	10	10	146
Wyoming	69	71	69	....	20	5	44	2	4	75
Total United States	4,472	4,277	3,448	+ 29.7	3,243	552	677	225	754	5,451

March Activity Places First Quarter Completions 11.6 Percent Over 1939

STATE OR DISTRICT:	[1]March, 1939, Total Completions	[2]Feb., 1940, Total Completions	[3]MARCH, 1940, COMPLETIONS					CUMULATIVE COMPLETIONS, FIRST THREE MONTHS, 1939 AND 1940						
								Total Wells			Details of 1940 Completions			
			Total Wells	Oil	Gas	Dry	Initial Oil Production	1939	1940	Percent Change	Oil	Gas	Dry	Initial Oil Production
Arkansas	11	11	14	10	....	4	3,253	56	44	— 21.4	34	1	9	12,207
California	81	81	83	72	1	10	49,111	241	252	+ 4.5	225	7	20	152,099
Colorado	4	....	....	....	....	....	....	6	1	— 83.2	....	....	1	....
Illinois	239	209	263	233	5	25	298,245	864	808	— 6.5	673	9	126	597,994
Indiana	7	23	21	7	7	7	213	30	86	+ 186.7	40	14	32	5,086
Kansas	82	93	118	87	3	28	135,774	284	353	+ 24.2	272	9	72	384,031
Kentucky	30	9	11	6	....	5	178	149	52	— 65.0	31	1	20	1,814
Louisiana	79	92	99	68	8	23	17,278	223	338	+ 54.0	248	23	67	69,145
North Louisiana	37	24	47	34	7	6	3,340	92	122	+ 32.6	78	21	23	8,115
South Louisiana	42	68	52	34	1	17	13,938	131	216	+ 64.8	170	2	44	61,030
Michigan	92	88	93	43	1	49	5,996	270	315	+ 16.6	182	9	124	43,925
Mississippi	....	8	10	7	....	3	5,045	1	34	+3300.0	22	1	11	15,062
Montana	4	2	2	2	....	....	255	22	27	+ 22.7	19	2	6	2,023
New Mexico	43	8	50	45	....	5	19,519	138	180	+ 30.5	143	7	30	58,579
New York	[4]33	[4]67	[4]89	[4]83	2	4	405	[4]115	[4]262	+ 128.0	252	3	7	1,349
Ohio	[4]48	[4]49	[4]57	[4]28	19	10	372	[4]194	[4]212	+ 9.3	93	76	43	790
Oklahoma	141	145	152	84	10	58	13,851	440	479	+ 8.9	269	32	178	91,752
Pennsylvania	[4]78	[4]196	[4]171	[4]151	11	9	164	[4,5]390	[4,5]822	+ 110.5	555	89	106	628
Texas	611	710	810	582	32	196	318,519	2,485	2,448	— 1.5	1,757	73	618	1,036,226
East Texas Field	33	28	21	20	....	1	33,342	191	75	— 60.8	71	....	4	134,176
Rest of East Texas	15	9	26	11	8	7	3,064	66	59	— 10.6	23	16	20	10,467
North Texas	143	143	182	119	1	62	67,752	367	546	+ 48.9	368	4	174	196,604
South Texas	216	195	204	138	9	57	46,427	702	637	— 9.3	400	16	221	143,791
Corpus Christi Area	97	89	85	69	3	13	32,449	312	283	— 9.3	201	5	77	107,287
Laredo Area	78	92	100	62	6	32	13,053	274	297	+ 8.4	179	11	107	34,529
San Antonio Area	41	14	19	7	....	12	925	116	57	— 50.8	20	....	37	2,975
Texas Gulf Coast	106	91	89	66	....	23	15,929	366	294	— 19.6	215	6	73	55,899
Texas Panhandle	22	35	49	38	7	4	15,372	80	138	+ 72.5	116	17	5	41,124
West Texas	154	150	173	158	2	13	132,139	489	516	+ 5.5	479	3	34	420,835
West Central Texas	27	59	66	32	5	29	4,493	94	183	+ 94.9	85	11	87	32,330
West Virginia	45	42	34	7	21	6	20	138	148	+ 7.3	32	89	27	256
Wyoming	14	10	9	6	1	2	11,132	28	37	+ 32.1	28	3	6	25,126
Total United States	1,747	1,891	2,086	1,521	121	444	879,330	6,180	6,898	+ 11.6	4,875	448	1,463	2,498,092

[1] Wells completed in the four weeks, or 28 days, ended March 25.
[2] Wells completed in the four weeks, or 28 days, ended February 24.
[3] Wells completed in the four weeks, or 28 days, ended March 23.
[4] Includes water-input and pressure wells.
[5] January and February totals revised in accordance with The Producers Monthly, organ of the Bradford District Pennsylvania Oil Producers Association.

Gun Perforation and Acidization in Open Formation

Of the Limestone Pays in the Permian Basin

By J. A. JONES, Lane-Wells Company, Odessa, Texas

THE author states that in most wells in the area under discussion there is a very thick producing zone with great variation in saturation, porosity, permeability and density between the top and bottom of each zone, and that any type of completion in such wells that involves the section as a whole may not gives the best results.

Selective gun perforations of the saturated zones according to the formation variations as indicated by cores or drilling rate curves—concentration of shots in the more dense sections—greatly increase the surface exposed to acid action. The channels and crevices created by the bullets affect the permeability factor by connecting separated pore spaces and giving increased outlet to the bore.

Acid treatment following gun perforation has given excellent results in increasing the potentials and rates of recovery on a high percentage of the wells to which this technique has been applied.

This paper was presented at the Spring Meeting of the Southwestern District A.P.I. Division of Production, Houston, Texas, March 28-29, 1940. The statements and opinions expressed herein are those of the author, and should not be construed as an official action or opinion of the Institute nor of this publication.

A NEW METHOD of well completion is attracting favorable attention in the fields of the Permian Basin. It consists of selectively gun perforating the saturated lime pays below casing and then treating with several stages of acid. Increased penetration of acid through perforations is thus obtained wherever desired in the pay section without impairing the well for further operations or necessitating the length cleanouts. This method is especially adapted to the lime pays which compose the major producing horizons in this basin.

Many wells in this area have been lost in the process of completion either because of erroneous interpretation of the many factors involved, or failure to consider all factors, when determining the completion procedure.

In most wells there is a thick pay section, and frequently there are great changes in the saturation, porosity, permeability, and density between the top and the bottom of each zone so that often any type of completion that affects the pay section as a whole will not give the best results.

This is one of the main reasons why the selective gun perforation of the saturated zones according to the formation variations in each well has been giving good results.

The porosity and permeability of the lime zones are a considerable factor in determining the amount of increase in production that can be obtained by gun perforation. Where a lime pay has a good saturated porosity and a high vertical permeability, a considerable increase in production can be readily obtained by increasing the horizontal permeability through perforation, as shown in Figure 1. This action connects the interstices and allows the oil more freedom of flow. Through the channels thus opened, the acid, if used, will be able to reach a much greater area of the pay zone, and the friction in the flow of oil to the bore hole will be materially decreased.

In tight lime formations where there is low permeability in both directions, perforation will increase the permeability; but, of course, such good results cannot be obtained as in the first case because there are only a few channels present. Sometimes the tight formation extends only a short distance from the bore hole, and in such a case the perforations might go entirely through and into a formation of good porosity beyond. This will bring, of course, very good results.

Experiments made in quarries where the Hunton and Arbuckle formations are exposed, to determine the amount of penetration that is obtained, show that gun perforation of open limes results in penetration of 10 to 14 inches. It was found also that the penetration was increased by wetting the limestone; when the formation was saturated to the depth of about 2 inches, the penetration of the bullet was increased by about 4 percent. It was observed that the hole made in the formation is cone shaped with the mouth many times larger than the diameter of the bullet, thereby exposing a large surface to the acid treatment. The number of shots per foot will greatly affect the amount of surface in the formation that is exposed to the action of the acid. In areas of low permeability the number of shots per unit area should be greatly increased (Figure 2) and should be decreased in areas of high permeability.

In wells from which cores have been taken, the tight lime sections can be readily located by core analysis; but where no cores are available, it will be found practical to determine the characteristics of this section by consulting the drilling-time curve. The longer the drilling time, the more dense the structure is at that point. When any section of the pay zone is known to have no saturation, it may be passed over so that perforations will not be wasted in a place where no benefit can be expected.

Perforation also increases the horizontal movement of the acid by opening up lines of least resistance which carry the acid in a uniform manner to various parts of the formation. Every crack and crevice made by the penetration of the bullet is opened up still further by the action of the acid, making a many-branched channel by means of which the acid of later treatments is carried to every part of the pay zone.

It would seem that any method which makes it unnecessary to use a high initial pressure for the introduction of acid would aid materially in preventing the formation

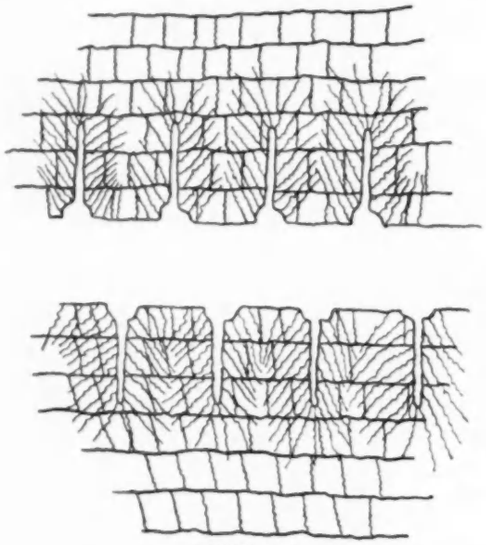


FIGURE 1

Artificial permeability attained by shooting formation with high vertical permeability and low horizontal permeability.

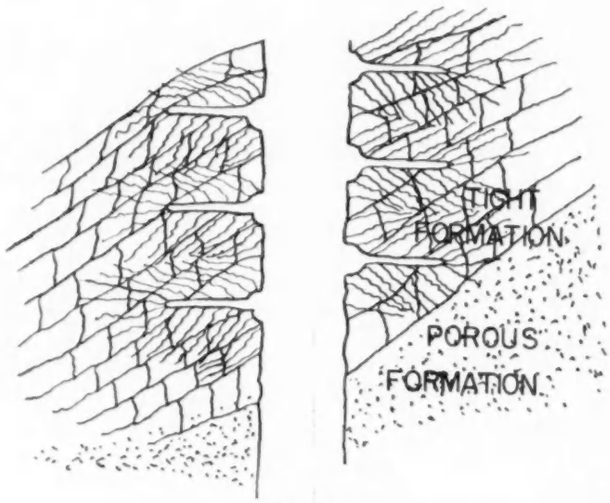


FIGURE 2

Increasing permeability of tight section by increasing surface to acid to compare with more porous section.

of channels. Such channels might direct the course of subsequent acid treatment, either toward water zones below or to gas zones above the pay, thus allowing entry of bottom-hole water or causing a high gas/oil ratio.

Another factor to be considered is the cleaning effect which gun perforation has on the face of the bore hole. In a great many wells the pay zone penetrated by the well bore has been sealed by the drilling fluid. That this has happened has been proved by the reduction in pressures required for the entry of the initial acid treatment after the use of gun perforation. In some wells this sealing does not take place until after the second or third acid treatment, and in a few cases it has ruined the well so affected.

Since wells in the Permian Basin have no uniformity of porosity or of permeability, maximum penetration of the acid through the help of perforation in a certain type of formation may mean the difference between obtaining a good producing well or a very poor one. The perforation may enable the acid to reach a section having good porosity and saturation; while without this help the acid would not have been able to penetrate the tight lime near the well bore. Completion by perforation gives results quite different from those obtained by completion with nitroglycerin. Gun perforations leave the formation in a more natural condition by the nature of its action. Channels are created in a manner which does not destroy the ones already existing, and all results are toward an increase in the permeability of the formation. This higher permeability will naturally cut down the flow resistance near the well bore. In nitro completions this resistance is lowered by the removal of a large amount of material adjacent to the bore hole, but the permeability of the pay zone is not increased beyond this point. In fact, the debris caused by the nitro shot often clogs the natural channels in the formation and actually decreases the effective permeability. Rapid decline in the production of many wells completed in this manner is evidence that this clogging action continues to build up while the well is on production.

From observation a great amount of fine material is removed from the formation by gun perforating the open formation. In some wells an extra day has been required to swab the well clean after completion by this method, but after the first cleaning there has been no further material coming into the well. This indicates that the bullet leaves clean fractures and does not break up the formation in such a manner that it is continually sloughing off into the hole while the well is producing.

The completions that have been made by the methods of gun perforating the lime pays of the Permian Basin in open formation below casing all follow a similar procedure. In all cases the wells have been drilled in with oil and then swabbed clean, either through the casing or the tubing. It is customary to acidize these wells, a three-stage treatment generally being considered the best method.

The majority of the wells have been gun perforated before the initial treatment of acid since most operators feel that best results are obtained by this sequence. The density of the perforations has usually been two to three per foot with the tight zones being given the greatest number of shots and the softer pays having a wider spacing. As very few of the wells so completed have been cored, the location of the soft and hard sections has been derived from the drilling-time curve.

The first stage of the acid treatment is generally 500 to 1,000 gallons, the smaller amount serving as a wash to prepare the formation for the subsequent treatments by thoroughly cleaning the exposed surfaces. The two, or possibly three, later treatments are in larger amounts, anywhere from 1,000 gallons up, with the volume of each treatment larger than that of the preceding one. This is considered necessary because the area of formation which is exposed to the treatment is increased each time.

After each successive acid treat-

ment, a production test is made. The operators wish to know the effectiveness of each stage in order to compute the amount of acid to use in the following treatment. The amount of acid used varies in different fields and also among the operators in the same field, each having his own idea as to the proper amount. In one well good results have been obtained by gun perforating the formation after the first two stages of acid treatment. Only one well has been completed in this manner, but some engineers feel that better results would have been obtained if this method had been followed in other wells.

Some companies leave several dense lime sections unperforated in order to have good, undisturbed packer points in which to place a formation packer at some future time when it is needed. Most operators treat their wells through tubing with a packer set just above the pay zone which is being acidized. This facilitates rapid removal of the spent acid. In most fields of the Permian Basin this is essential, as it has been found that acid will foul the formation when allowed to remain too long. Wells have been damaged when this removal has been delayed.

Statistics from the wells that have been completed with the gun-perforator method in the Permian Basin have shown that production has been increased in every case. The final and permanent results will not be available for several months as most wells have to be produced for long periods at present allowables in order to get the full effect of the cleaning. It has been found in several cases that the perforating was followed by a reduction in the pressure required to break down the formation for subsequent acid injection, and most of the wells have shown a marked improvement in flow characteristics. The drop in bottom-hole pressure and the decline curves are not available on these wells as it is too early to determine what they will be, but a good gas/oil ratio has been usually obtained.

Figures are not available on all the wells which have been completed in this manner. Some of them are still testing, and the information is not obtainable on others; but even though we have no exact statistics on the results from all of them, we have been given the information that the improvements desired have been obtained. From such comparison figures as are available, we believe that the wells completed in this manner have made better records than offset wells completed by other methods.

Table 1 is the resume of completion data furnished for 16 wells completed by gun perforation in open hole below casing. These wells are located in six different fields in the Permian Basin. Table 1 shows the characteristic increase in production after perforating, and a still further increase after acidization. While no figures are available relative to the production of wells offsetting these which have been completed by other methods, interested operators have claimed that this method has given superior results. * * * *

Almost any kind of remedial work can be undertaken in a well that has been gun perforated for completion since the formations have not been greatly disturbed, and wells so completed have not been harmed or rendered unfit for later workover work. All of the wells completed in Permian Basin fields have been perforated at approximately the same density;. so there is no way of knowing what the results would have been had this density been increased, but in other areas where this method has been used, it has been found that —up to a certain point—increasing the density of perforations will give sufficiently better results to be economically sound practice.

This method may be the answer to some of the acid-treatment troubles which occur in some lime wells. Some wells will respond to the first and second application of acid, but production is not increased by further treatment. In other wells it has been noticed that each subsequent treatment of acid actually decreases the output of the well. In wells of this type the best procedure probably would be to perforate the formation after the second acid treatment.

Old wells, about to be placed on the pump, would have their flowing life increased if the formation were perforated and acidized. This treatment would remove any contamination on the face of the pay zone which had accumulated there through a long producing life and would also cut down frictional resistance to the flow of oil by an increase of channels.

There is no doubt that gun perforation of the open lime pays before acidization will have a definite place in future well completions and will also be used extensively in remedial work in old wells. The benefits have been well attested.

TABLE 1
Production Tests—Gun Perforator Completions

Well No.	Per Hour Initial Flow (Barrels)	Gun Perforation		ACID TREATMENT						Initial Production Bbls. per 24 Hrs.
				First Stage		Second Stage		Third Stage		
		Number of Shots	Barrels per Hour	Gallons	Barrels per Hour	Gallons	Barrels per Hour	Gallons	Barrels per Hr.	
1	(s) Few bbl.	271	(s) 1	3,000	(s) 5.5	8,000	(f) 19.5	.....	.....	(f) 471
2	(f) 12.5	224	(f) 38	2,000	(f) 27	5,000	(f) 26.5	.....	.....	(f)1,202
3	(s) 1	176	(s) 1.33	2,000	(sf) 4	4,000	(f) 6	7,000	(f) 10	(f) 311.88
4	(s) 1.5	370	?	1,000	(s) 3.5	3,000	(sf) 5	.....	.....	(f) 509
5	(s) .5	195	?	1,000	(s) 4	3,000	(s) 2.5	7,000	(f) 2.5	(f) 89
6	?	120	(f) 6	2,000	(f) 5.5	1,000	(f) 3	3,000	(f) 14	(f) 340
7	(p) 5—25% water	123	(s) 4—oil	5,000	(p) 7.3—35% water	.....	.....	....	....	(p) 114—28% water
8	(p) 3.1	40	(p) 5.75	.....	.....	.....	.....	....	....	(p) 139
9	(s) 11	78	(s) 6.3 & 2.5	500	(f) 5.75	2,500	(f) 18	.....	.....	(f) 436
10	(f) 8	58	?	1,000	(f) 8	2,500	(f) 11	5,750	(f) 35	(f) 938
11	*	76	(f) 5	2,000	(f) ‡8	3,000	(s) †3.5	Flow Valves Installed		(f) 84
12	Dry	60	(s) 2	500	?	1,000	(f) 4.1	Through ½" Choke		(f) 99
13	Small Show	58	?	1,000	(f) 6—	1,500	(f) 8	....	....	(f) 188
14	Small Show	40	?	1,500	(f) 10	.....	.....	....	....	(f) 442
15	Small Show	40	?	1,000	?	200	(f) 4.4	....	....	(f) 144
16	(s) .5	58	?	250	(f) 4.75	1,500	(f) 25—	....	....	(f) 474

f—Flowed. s—Swabbed. sf—Swabbed and Flowed. p—Pumped. ?—No information. *—Static head 300 feet of oil. †—3.5 Bbls. per Hr., 24-hr. run. ‡—8 Bbls. per Hr., 6-hr. run.

Well No. 4 was completed by gas lift through flow valves with its own gas. Well No. 6 was gun perforated after the second stage of acid. Well No. 7—This was oil production, as well was making water. Biggest increase was in water. Well No. 11—Was perforated for gas only—after perforation it flowed with its own gas. Well No. 12—This well would not flow before perforation.

Factors Affecting Tank Steamer Transportation[1]

By V. R. GARFIAS and J. W. RISTORI
Cities Service Company, New York

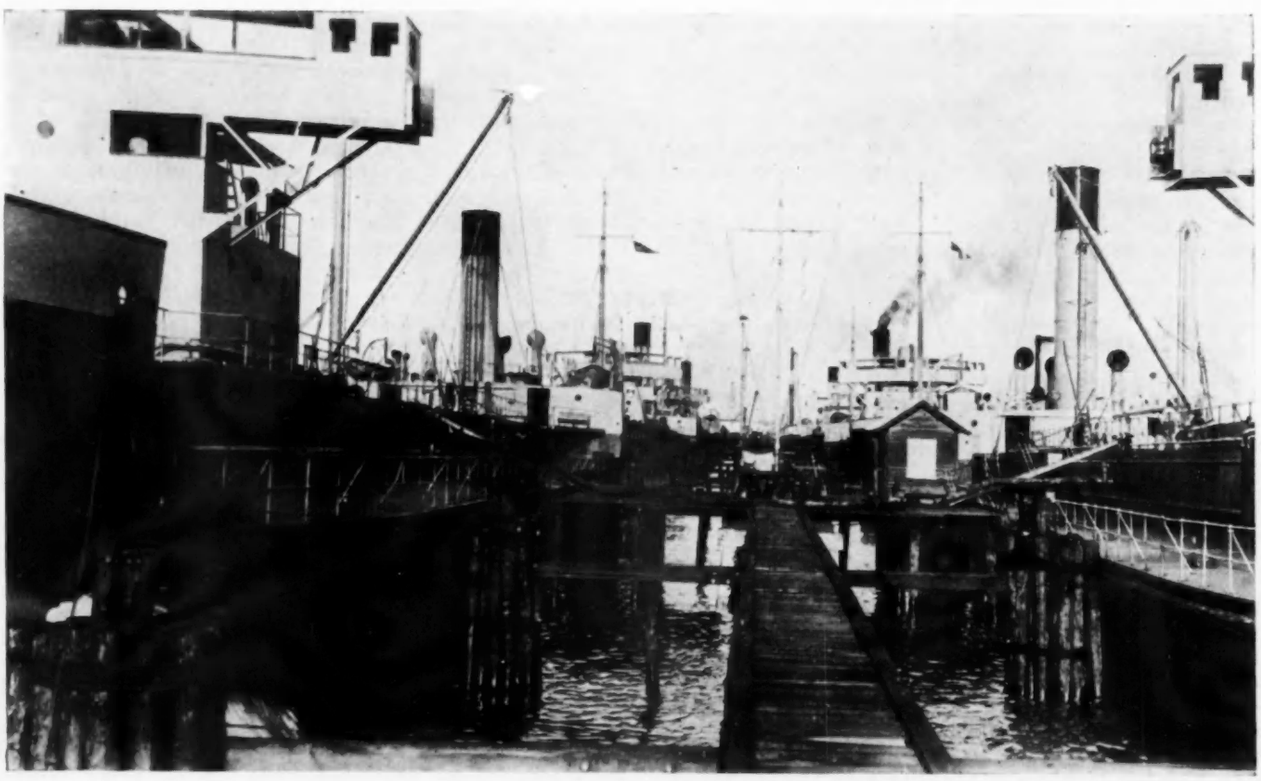
IT IS estimated that of the two billion odd barrels of petroleum and related fuels representing the world's consumption for civil purposes in 1939, 53 percent was transported in tank steamers, and of this about 51 percent or approximately 550,000,000 barrels were carried in American built and operated tankers between American harbors.

With the exception of the United States and Russia, and to a lesser extent Germany, all the leading countries must rely almost entirely on foreign sources for their petroleum requirements, and the availability of this supply is entirely dependent on the safe operation at all times of an adequate fleet of tank steamers. Even the United States and Russia in 1939 imported overseas 59,000,000 and 6,000,000 barrels, respectively. They also use internal waterways to transport part of their requirements.

Tank steamer fleets by countries of registry at the begninning of 1939 are shown on Table 1, but it should be noted that some of the tankers under Norway, Venezuela and Panama registry are owned by American and English firms.

Tanker construction in the last 5 years is shown on Table 2. It will be seen that the trend during this time is toward larger and speedier boats, the latest Japanese tankers having carrying capacity of over 100,000 barrels and rated speeds up to 19 knots per hour. It should be pointed out that practically all the tankers flying the Norwegian flag were built in Great Britain, Sweden, Germany and Denmark; that the latest Russian tankers were built in Japan; that the Panama tankers are largely of German construction, and that the 25,000-barrel Venezuelan tankers which ply between Maracaibo and Aruba and Curacao were built in England and are owned largely by English companies. The table includes about 40 foreign tankers that are used in the transporta-

[1] Prepared for but not completed in time for presentation at the annual meeting of the American Institute of Mining and Metallurgical Engineers in New York in mid-February.



Millions of barrels of oil reach refineries of the West Indies and other parts of the world annually from this busy Venezuelan wharf on the shore of Lake Maracaibo.

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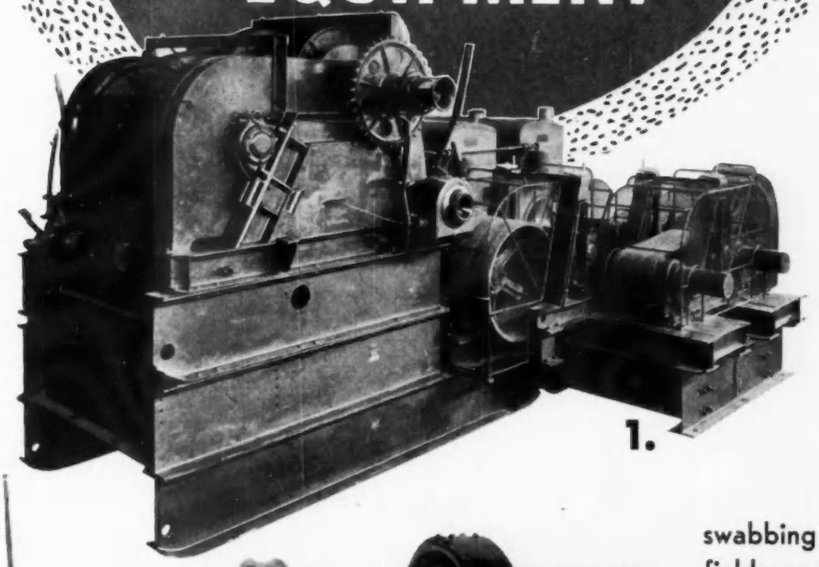
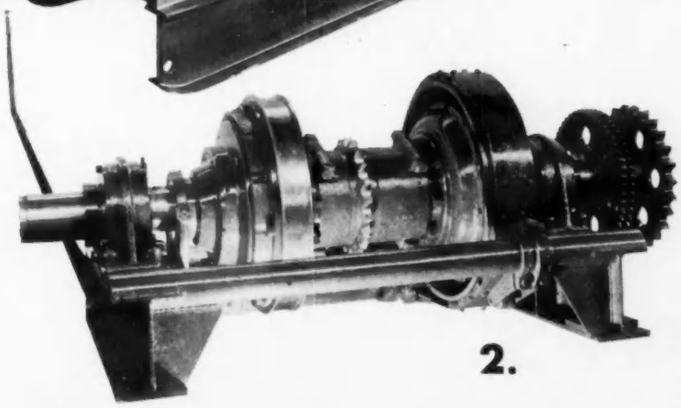
3.



1.



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International Ship Canals

	Suez Canal	Kiel Canal	Panama Canal
Year opened to traffic	1869	1895	1914
Length, miles	104	53	40
Minimum draft, feet	33	29	36
Time of crossing, hours	15	8	8
Traffic, tons:			
1936	32,379,000	19,746,000	27,370,000
1937	36,491,000	.....	29,299,000
1938	34,418,000	.....	26,227,000
Tolls per registered ton loaded	£0-5-9	0.138 R.M.	$ .90
Tolls per registered ton in ballast	£0-2-10½	0.110 R.M	$ .72
Tolls per round trip U. S. cent per barrel of crude oil	$0.13¼	$0.01	$ .10

tion of molasses and about 10 in the whale oil trade.

The most important exporting and importing centers and the distances between them are shown on Table 3. It should be noted that Curacao and Aruba, through which the bulk of the Venezuelan oil is re-exported, are not in Venezuelan territory, nor are Haifa or Tripoli—the English and French terminals of the pipe lines connecting the Iraq fields to Mediterranean seaboard—in Iraq.

It may be surprising to some to learn that the harbors in northwestern Europe are practically equidistant from New York, Constanza and Haifa. Consequently, since the cost of marine transportation, other things being equal, varies with the distance between terminal harbors, it is immaterial to the London consumer whether he buys his oil from the American, from the Rumanian, or from the Iraq fields. It may also be noted that the Mediterranean ports of Italy, France and Spain are not nearer to Iraq than to Rumanian oil and that the export harbors of the fields of Colombia and Venezuela are slightly nearer to New York than are those of the Texas Gulf Coast.

Tanker Rates

In order to establish a basis for calculating cost and a comparison of the availability by tank steamers of the various exporting to the importing centers (and notwithstanding the fact that outside of American waters and certain restricted routes it is much cheaper to operate a foreign than an American tanker) it has been decided to take as a type in this study a tank steamer of American registry of 10,000 deadweight tons and a capacity of 100,000 barrels which operates under the following conditions:

Speed, knots per hour	12
Number of crew	42
Days in port, per trip	6
Cost of tanker per deadweight ton	$ 150.00
Interest on investment, percent	6
Insurance rate, percent	5.5
Maintenance, per day	$ 100.00
Stores, wages, provisions, overhead, per day	$ 260.00
Fuel at 90c per barrel, per day, Gulf ports	$ 165.00
Port charges per trip	$1500.00

The days required for round trip by such tanker between the exporting and importing centers listed on Table 3 are shown on Table 4.

From the above data and tables the approximate cost per barrel of transportation can readily be calculated. Exclusive of canal tolls, it will be found that the rates for a 20-day round trip will be 25 cents per bar-

TABLE I
Tanker Fleets By Countries
At the Beginning of 1939

Carrying Capacity	British	Norway	U.S.A.	Netherlands	Italy	Panama	Sweden	Japan	France	Germany	Venezuela	Russia	Canada	Argentina	Others	Total
50,000 lbs. or less	135	20	61	58	32	3	4	5	17	17	31	15	14	17	29	458
50,000 to 70,000 lbs	63	35	56	9	37	2	1	3	17	5	1	1	1	8	14	253
70,000 to 80,000 lbs	46	35	114	10	5	7	1	3	5	5	..	6	1	2	4	244
80,000 to 90,000 lbs	80	39	77	1	3	3	3	11	2	..	..	3	..	2	5	229
90,000 to 100,000 lbs	32	28	18	6	..	..	2	3	4	..	..	6	..	1	3	103
100,000 lbs and over	130	110	93	26	4	32	10	14	13	11	..	..	7	1	10	461
Unclassified	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	33
Total	486	267	419	110	81	47	21	39	58	38	32	31	23	31	65	1,781

TABLE II
Tank Steamer Construction

	1935	1936	1937	1938	†1939
British Registry	17	25	31	29	3
Norway Registry	15	14	20	13	5
United States Registry	2	9	16	18	1
Netherlands Registry	9	10	5	17	..
Italy Registry	..	..	..	..	1
Panama Registry	..	1	1	2	1
Sweden Registry	1	2	2	2	..
Japan Registry	2	6	4	3	..
France Registry	1	1	4	1	1
Germany Registry	2	3	3	2	..
Venezuela Registry	..	..	..	2	..
Russia Registry	3	..	6	..	..
Canada Registry	..	..	..	2	..
Argentina Registry	1	..	1	1	..
Others Registry	..	3	1	2	2
Total Registry	53	74	94	94	14
Diesel	42	62	71	66	13
Turbine	11	12	23	28	1
Average D. W. T.	11,500	11,700	11,800	11,400	15,100
Maximum D. W. T.	18,005	22,190	28,500	18,105	16,000
Maximum D. W. T. (Country)	France	Japan	Germany	U. S.	Panama
Average Capacity, (barrels)	92,700	93,300	95,200	94,000	110,000
Maximum Capacity, (Barrels)	150,000	160,000*	175,000*	154,226	128,000*
Maximum Capacity, (Country)	France	Japan	Germany	U. S.	Panama
Average Speed Knots	11¾	12⅜	12⅛	12¼	12¼
Maximum Speed Knots	17	18	16	19	13
Maximum Speed Knots (Country)	Japan	Japan	Japan	Japan	Norway, U.S.

Notes: † Covers only early part 1939. * Estimate.

TABLE III

Distances in Nautical Miles Between Principal Oil Exporting and Importing Centers

		New York	Texas Ports	Los Angeles	San Francisco	Tampico	Cartagena	Curacao	Talara	Port of Spain	Batum	Haifa	Abadam	Balik Papan	Miri	Palembang	Surabaya
Aden	Arabia	6513†	8057†	10602†*	10934†*	8181†	7445†	6996†	8517†*	6529†	2787†	1562†	1941	4684	4298	3923	4394
Barcelona	Spain	3711	5265	7800*	8136*	5361	4536	4194	5699*	3726	2085	1783	4925†	7709†	7289†	6929†	7389†
Buenos Aires	Argentina	5871	6504	8346*	8678*	6518	5150	4752	4590	4280	7735	7378	9028	9779	9833	9328	9360
Canal Zone	Balboa	2017*	1536*	2913	3245	1528*	324*	740*	828	1202*	6779*	6379*	9675†*	9885	9985	10885	10632
Canal Zone	Cristobal	1974	1493	2956*	3288*	1485	281	697	871*	1159	6736	6336	9632†	9928*	10028*	10928*	10675*
Capetown	U. of S. Africa	6786	7519	9385*	9721*	7464	6165	5770	7742	5270	6782†	5549†	5240	6000	6054	5549	5560
Colombo	Ceylon	8609†	10153†	9432	9123	10278†	9564†	9082†	10603†*	8614†	4873†	3648†	2507	2625	2239	1864	2335
Copenhagen	Denmark	3846‡	5573‡	8306*‡	8642*‡	5542‡	4940‡	4620‡	6095*‡	4534‡	4188‡	3831‡	7048†‡	9835†‡	9415†‡	9055†‡	9525†‡
Dakar	Senegal	3430	4452	6715*	7047*	4576	3532	3067	4630*	2600	3900	3500	6796†	9492†	9106†	8731†	9201†
Durban (Pt. Natal)	U. of S. Africa	7561	8253	10181*	10517*	8264	6965	6520	8503	6031	6023†	4753†	4361	5300	5337	4837	4949
Fayal	Azores	2098	3627	6213*	6549*	3761	3160	2689	4128*	2222	3531	3131	6427†	9124†	8738†	8363†	8833†
Genoa	Italy	4052	5606	8141*	8477*	5709	4877	4535	6040*	4067	1899	1529	4815†	7544	7124	6764†	7234†
Gibraltar Straits		3175	4719	7264*	7600*	4854	4140	3658	5179*	3190	2428	2028	5324†	8021†	7635†	7260†	7730†
Hamburg	Germany	3676	5329	8026*	8358*	5372	4770	4450	5925*	4254	4018	3661	6878†	9665†	9245†	8885†	9355†
Havre	France	3220	4833	7570*	7898*	5050	4314	3970	5469*	3798	3575	3186	6402†	9189†	8769†	8409†	8879†
Hongkong		11212*	10731*	6380	6043	10665*	9519*	9937*	9663	10397*	7863†	6593†	5322	1700	915	1700	1900
Honolulu	Hawaii Isl	6702*	6221*	2228	2091	6213*	5009*	5427*	4806	5894*	11464*	11089*	9739	5200	5300	6200	5394
Las Palmas	Canary Isl	2965	4421	6760*	7096*	4545	3570	3112	4675*	2645	3109	2709	6095†	8702†	8316†	7941†	8411†
London		3343	5022	7719*	8051*	5154	4463	4120	5618*	3940	3676	3324	6541†	9385†	8965†	8605†	9075†
Manila	Phil. Isl	11364*	10988*	6530	6221	10875*	9671*	10087*	9573	10549*	7694†	6523†	5219	1057	700	1450	1850
Marseilles	France	3897	5431	7980*	8312*	5540	4712	4370	5875*	3902	2001	1707	4849†	7633†	7213†	6853†	7323†
Montreal	Canada	1580	3159	6127*	6459*	3301	3093	2700	4015*	2795	5564	5207	8439†	11211†	10791†	10431†	10901†
Naples	Italy	4184	5728	8264*	8596*	5824	4999	4670	6163*	4189	1600	1194	4445†	7229†	6809†	6449†	6919†
New York			1898	4934*	5266*	2030	1853	1769	2829*	1939	5603	5578	8450†	11228†	10808†	10448†	10918†
Port Said	Egypt	5127	6661	11983*	12315*	6785	6082	5600	7121*	5132	1391	166	3382†	6079†	5693†	5318†	5789†
Rio de Janeiro	Brazil	4770	5366	7305*	7637*	5417	4048	3650	5204*	3130	6580	6223	8467†	9308	9362	8857	8922
Rotterdam	Holland	3415	5068	7748*	8080*	5117	4492	4166	5647*	3993	3758	3401	6608†	9395†	8975†	8615†	9085†
Shanghai	China	10573*	10168*	5810	5387	10028*	8880*	9298*	9467	9765*	8672†	7408†	6046	2226	1650	2526	2976
Singapore	Straits Settlement	10153†	11698†	7864	7353	11822†	11108†	10626†	10687	10158†	6417†	5193†	3889	1053	850	292	763
Suva	Fiji Isl	7960*	7472*	4793	4750	7421*	6260*	6676*	6000	7138*	11202†	9977†	8673	4160	4860	4560	4061
Sydney	Australia	9691*	9330*	6511	6448	9209*	7998*	8416*	6750	8883*	9693†	8485†	7364	4306	4600	4006	3562
Valparaiso	Chile	4633*	4152*	4808	5140	4144*	2940*	3358*	1804	3825*	9389*	9036*	10122	9558	10161	10158	9500
Vancouver	Br. Columbia	6049*	5568*	1144	812	5560*	4356*	4774*	4742	5241*	10805*	10448*	10812	6487	6433	7000	6733
Wellington	N. Zealand	8522*	8041*	5857	5900	8033*	6829*	7247*	5742	7714*	10614†	9203†	8291	4700	5200	5000	4461
Yokohama	Japan	9699*	9317*	4839	4536	9165*	8006*	8424*	8200	8891*	9364†	8127†	6762	2700	2300	3000	3607

* Panama Canal † Suez Canal ‡ Kiel Canal

rel, and 37, 49 and 61 cents per barrel for round trips of 30, 40 and 50 days respectively.

Canal Tolls

As the cost of marine transportation varies directly with the distance between terminal harbors, it follows that the use of canals that shorten such distance is economical whenever the tolls represent a saving over the added cost of the longer route that eliminates the use of the canal.

The following table gives the salient features of the canals, utilized in international trade.

The tolls have been converted into United States cents per barrel at the sterling rate of $4.85 and Reich mark rate of $0.40. It should be kept in mind that, owing to the difference in weight per barrel, the same tanker transports, say, more barrels of gasoline than of crude oil.

TABLE IV

Days Required for Round Trip Between Principal Oil Exporting and Importing Centers

		New York	Texas Ports	Los Angeles	San Francisco	Tampico	Cartagena	Curacao	Talara	Port of Spain	Batum	Haifa	Abadam	Balik Papan	Miri	Palembang	Surabaya
Aden	Arabia	52†	62†	80†*	82†*	63†	58†	55†	66†*	52†	26†	17†	20	39	36	33	37
Barcelona	Spain	32	43	60*	63*	43	38	35	46*	32	20	18	41†	60†	57†	54†	57†
Buenos Aires	Argentina	47	51	64*	66*	51	42	39	38	36	60	57	69	74	74	71	71
Canal Zone	Balboa	20*	17*	26	29	17*	9*	11*	12	14*	53*	50*	74†*	75	75	82	80
Canal Zone	Cristobal	20	16	27*	29*	16	8	11	13*	14	53	50	73†	75*	76*	82*	80*
Capetown	U. of S. Africa	53	58	71*	74*	58	49	46	60	43	53†	45†	42	48	48	45	45
Colombo	Ceylon	66†	77†	72	69	77†	73†	69†	80†*	66†	40†	32†	23	24	22	19	22
Copenhagen	Denmark	33‡	45‡	64*‡	66*‡	45‡	41‡	38‡	49*‡	38‡	35‡	33‡	55†‡	75†‡	72†‡	69†‡	72†‡
Dakar	Senegal	30	37	53*	55*	38	31	27	38*	24	33	30	53†	72†	70†	67†	70†
Durban	U. of S. Africa	59	63	77*	79*	63	54	51	65	48	48†	39†	36	43	43	40	40
Fayal	Azores	21	31	49*	52*	32	28	25	35*	21	31	28	51†	70†	67†	64†	68†
Genoa	Italy	34	45	63*	65*	46	40	37	48*	34	19	17	40†	58	55†	53†	57†
Gibraltar Straits		28	39	57*	59*	40	35	31	42*	28	23	20	43†	62†	59†	57†	60†
Hamburg	Germany	32	43	62*	64*	43	39	37	47*	36	34	31	54†	73†	70†	68†	71†
Havre	France	28	40	59*	61*	41	36	34	44*	34	31	28	51†	70†	67†	65†	68†
Hongkong		85*	81*	50	48	80*	72*	75*	73	78*	61†	52†	43	18	12	18	19
Honolulu	Hawaii	53*	49*	22	21	49*	41*	44*	39	47*	86*	83*	74	42	43	49	43
Las Palmas	Canary Isl	27	37	53*	55*	38	31	28	39*	24	28	25	48†	67†	64†	61†	65†
London		29	41	60*	62*	42	37	35	45*	33	32	29	52†	71†	68†	66†	69†
Manila	Phil. Isl	86*	83*	51	49	82*	73*	76*	72	79*	59†	51†	42	13	11	16	19
Marseilles	France	33	44	62*	64*	44	39	36	47*	33	20	18	40†	59†	56†	54†	57†
Montreal	Canada	17	28	49*	51*	29	27	25	34*	25	45	42	65†	84†	81†	79†	82†
Naples	Italy	35	46	64*	66*	47	41	38	49*	35	17	14	37†	56†	53†	51†	54†
New York			19	40*	43*	20	19	18	26*	19	45	45	65†	84†	81†	79†	82†
Port Said	Egypt	42	52	89*	92*	53	48	45	56*	42	16	7	30†	48†	46†	43†	46†
Rio de Janeiro	Brazil	39	43	57*	59*	44	34	31	42*	28	52	49	65†	71	71	68	68
Rotterdam	Holland	30	41	60*	62*	42	37	35	45*	34	32	30	52†	71†	69†	66†	69†
Shanghai	China	80*	77*	46	44	76*	68*	71*	72	74*	67†	58†	48	21	17	24	27
Singapore	Straits Sett	77†	87†	61	57	88†	83†	80†	80	77†	51†	42†	33	13	12	8	11
Suva	Fiji Isl	62*	58*	39	39	58*	50*	53*	48	56*	84†	76†	66	35	40	38	34
Sydney	Australia	75*	71*	51	51	70*	62*	65*	53	68*	73†	65†	57	36	38	34	31
Valparaiso	Chile	39*	35*	39	42	35*	27*	30*	19	33*	71*	69*	76	72	77	77	72
Vancouver	Br. Columbia	49*	45*	14	12	45*	36*	39*	39	43*	81*	79*	81	51	51	55	53
Wellington	N. Zealand	66*	62*	47	47	62*	53*	56*	46	60*	80†	70†	64	39	42	41	37
Yokohama	Japan	74*	71*	40	38	70*	62*	65*	63	68*	71†	63†	53	25	22	27	31

* Panama Canal. † Suez Canal. ‡ Kiel Canal.

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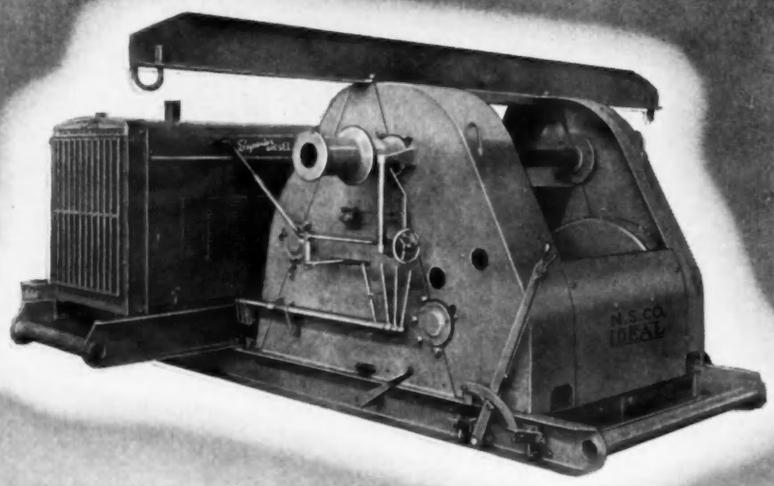

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Construction Features CONTRIBUTING TO SIMPLICITY AND EASE OF OPERATION

- Portability combined with ruggedness.
- Speed in rigging up.
- Special heavy duty constant mesh transmission, providing 4 hoisting speeds and 4 rotary speeds.
- Master friction clutch, providing control over all operation.
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- Easily accessible lubrication fittings and brake adjustment.
- Balanced drum assembly with 16" x 44" drum.
- Spray water cooling system for the 42"x8⅝" steel brake rims.
- Catheads easily removed from tapered ends of catshaft.
- Complete with roller chain and tie-down beam.
- Optional sand reel.
- Optional spudding attachment.

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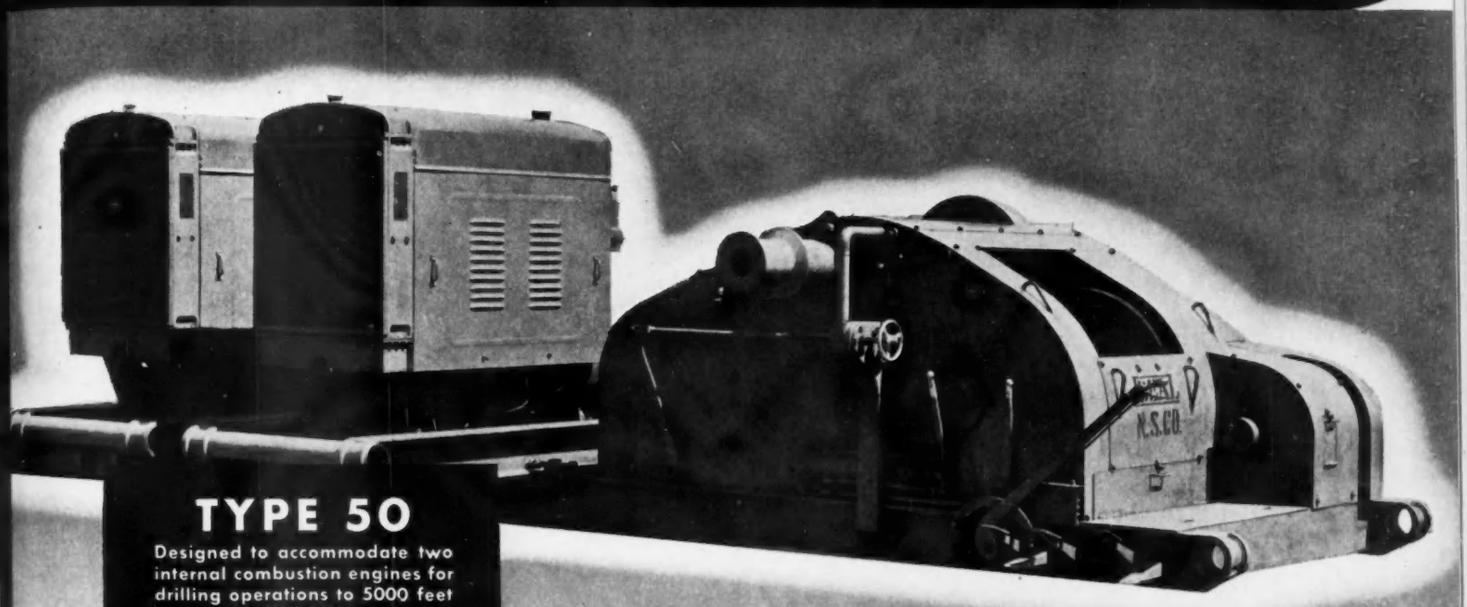

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ALLOY STEEL heat treated shafts for all the draw works hoisting drives, assuring reserve strength.

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Pumping Series Article No. 39

Locating and Counterbalancing Central Pumping Powers

By SYLVAIN J. PIRSON
Head, Petroleum and Natural Gas Department, The Pennsylvania State College, State College, Pa.

NOWADAYS, the petroleum engineer makes use of scientific principles in practically every phase of of his work as compared with the practice of "rules of thumb" which was still in favor two decades ago. Be the problem one of drilling mud, cementing, directional drilling, pumping, flowing or any other activity of production engineering practice, new steps are submitted to a quantitative analysis before their actual physical realization, as compared with the not so far distant practice of first installing new equipment and then seeing what happens. With the gradual decrease in the market price of crude, margins of profits have been reduced and such costly experiments have become prohibited. The petroleum engineer's job has often been a matter of balancing costs and returns with emphasis placed on a continuous attempt at reduction of production costs. Particularly, the reduction of pumping costs has received a great deal of attention.

In pumping studies, the dynamometer has played a prominent part. Introduced in 1923, it has become, during the past decade, as important to the petroleum engineer in diagnosing pumping troubles as the stethoscope is to the physician in diagnosing heart diseases, or better, as the electrocardiograph in detecting functional heart troubles.

The types of records obtained by means of an oil well dynamometer will not be discussed here as they have been described many times in the literature. Attention, in this article, will particularly be focussed on the application of dynamometer cards to the study of central pumping power problems and particularly to the application to the reduction of pumping costs by permitting a reduction to a minimum of the necessary prime-mover powers.

To this end a simplified type problem will be studied as follows:

"Being given the lease lay-out represented by Figure 1 and having five wells: A, B, C, D, E individually pumped and for which the individual dynamometer cards are known and are given by Figures 2 and 3, it is desired to replace the individual pumping units by a central power whose location and counterbalance for minimum power consumption is to be determined."

As in many engineering problems, it is necessary to resort to successive approximations in order to obtain a satisfactory location for the central power. However, a satisfactory location for the power may be obtained in this case in two steps. The first, which consists in obtaining a first rough approximation, is quite simple and has been already explained in the literature (Altman, B.—Locating and Counterbalancing Central Powers Involves Many Variables—THE OIL WEEKLY, May 8, 1939, p. 13), but will be repeated here for convenience. The lease is laid out to scale on light but stiff cardboard and holes are punched at each well location. Through each hole is passed a string supporting a weight proportional to the maximum load as recorded by the dynamometer and as obtained from Figures 2 and 3. The loaded cardboard is thereafter balanced around its center of gravity, the latter being determined by successive approximations until a satisfactory balance is obtained. The center of gravity so determined is marked on Figure 1 by point 0. The above may seem to be a rather rudimentary procedure and in order to test its accuracy the writer has evolved a different theory in order to determine the best location for a central pumping station. Knowing the approximate location 0 of the central power by the above procedure, pull-rod lines OA, OB, OC, OD and OE may be drawn on the lease map and the phase angle between the various wells determined. For instance, if one assumes a counter-clockwise rotation of the eccentric, Well B will be lagging on Well A by an angle AOB whereas Well C is leading on Well A by an angle AOC, and similiarly phase angles are determined for Wells E and D which respectively lead by an angle EOA and lag by an angle DOA on Well A. In order to find out the respective effort at each well during the rotation of the crank at the central power, the movement of rotation is divided into 12 equal parts. This can be better illustrated by considering Figure 2 where a circle is drawn on the zero line of dynamometer card A with the stroke as diameter. The circle is divided into 12 equal parts by known geometrical methods and the corresponding positions on the dynamometer trace are marked by numbers from 1 to 12 inclusive. These figures will be referred to throughout as crank positions. In order to determine the corresponding crank positions for the other wells and their dynamometer cards, circles are similarly drawn on the zero lines of each. It will save time if all the cards have been drawn with the same displacement, i.e., with the same dynamometer and spring constant, because it is then possible to draw a circle of constant diameter for each card and further geometric divisions of circle will not be necessary. If this is not the case, a new geometric division of the circle in 12 equal parts must be resorted to. For each card, the proper phase angle, as measured from the lease lay-out of Figure 1, must be plotted. For card B, for instance, the angle of lag AOB is measured at the center of the circle and crank position 1 determined; from which position the circle is now divided into 12 equal parts; the corresponding crank positions on the dynamometer trace of card B are thereafter determined as indicated on Figure 3. Similar geometric calculations are resorted to in order to determine crank positions on cards, C, D, and E and the results are recorded on Figure 3.

Once the preliminary step of determining corresponding crank positions on the various dynamometer

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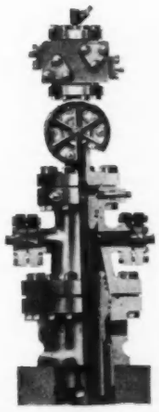

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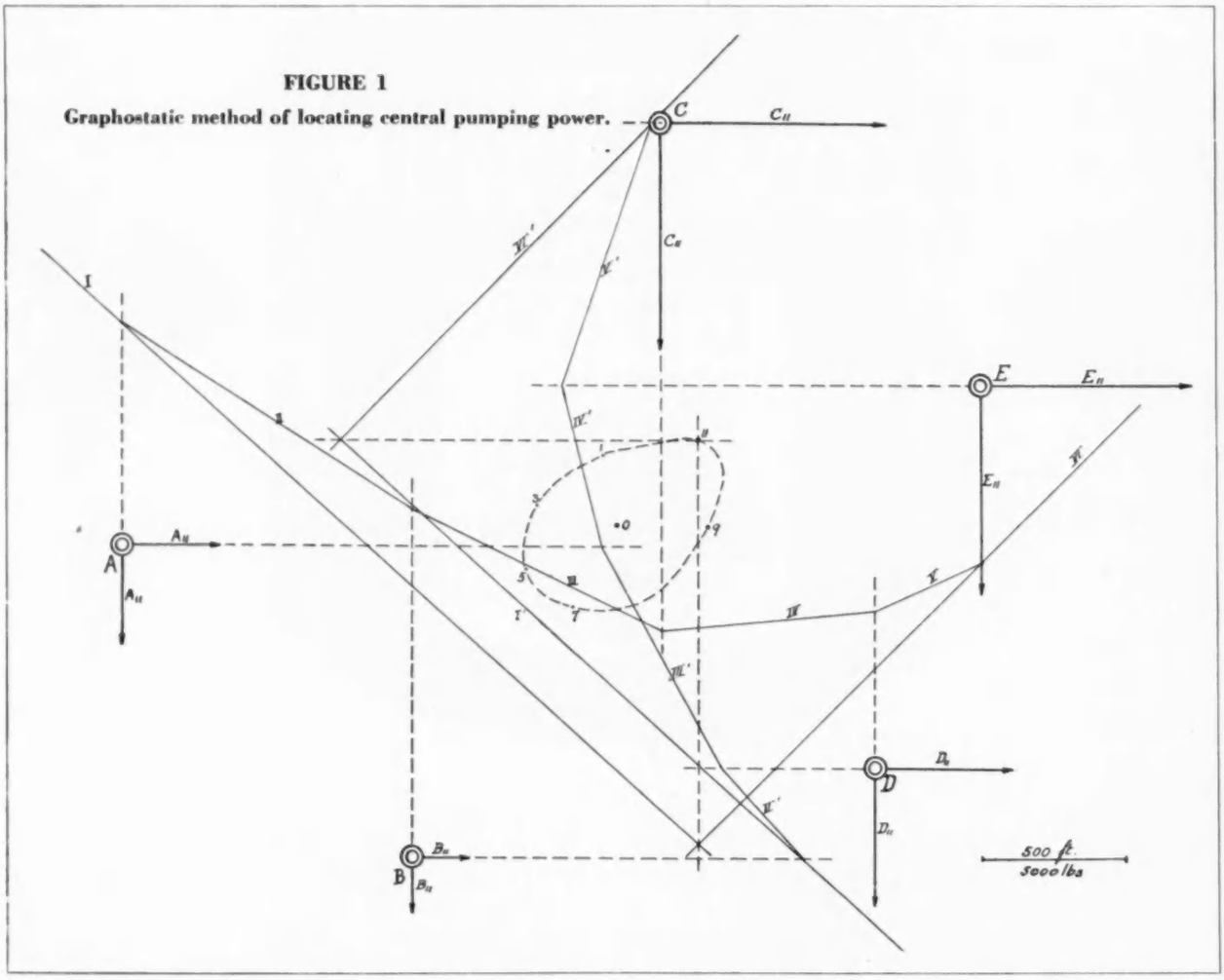
FIGURE 1

Graphostatic method of locating central pumping power.



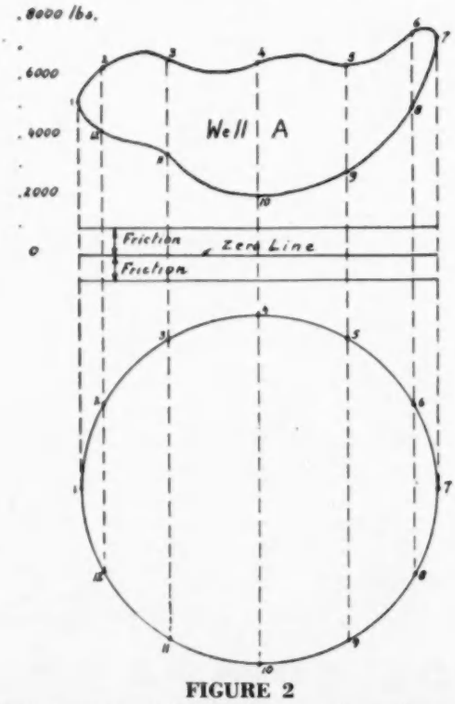


FIGURE 2

Dynamometer card for Well A and crank positions.

cards is completed, a graphostatic calculation may be resorted to, in particular when the power location O is not suitable from the point of view of transportation, water supply, accessibility, topography, etc. In this case it is necessary to determine an area in which the central power can be located and where the power will not be too much out of balance. The problem can be solved most simply and yet accurately by considering the lease lay-out as a rigid structure loaded at each well location by parallel forces whose intensities are obtained from the dynamometer cards and at each corresponding crank position. On Figure 1 are represented two such systems of forces, one vertical and the other horizontal, corresponding to crank position 11. On Figure 4, polygons of forces corresponding to the above two systems, are drawn and an arbitrary center 0 is located. Radial lines I, II, III, IV, V and VI are drawn from center 0, arbitrarily chosen, to the extremities of the forces in the vertical system. Each line, or vector, represents a force and the resultant force of I and II for instance if A_{11}, of II and III is B_{11}, etc. Similarly a system of vectors I′, II′, III′, IV′, V′ and VI′ is drawn from center O to the extremities of each force representing the horizontal system. In order to find the center of application to the structure of the resulting force of each system, horizontal or vertical, polygons of forces are drawn as represented on Figure 1 by drawing vectors parallel to the system I—VI for the vertical system and to the system I′—VI′ for the

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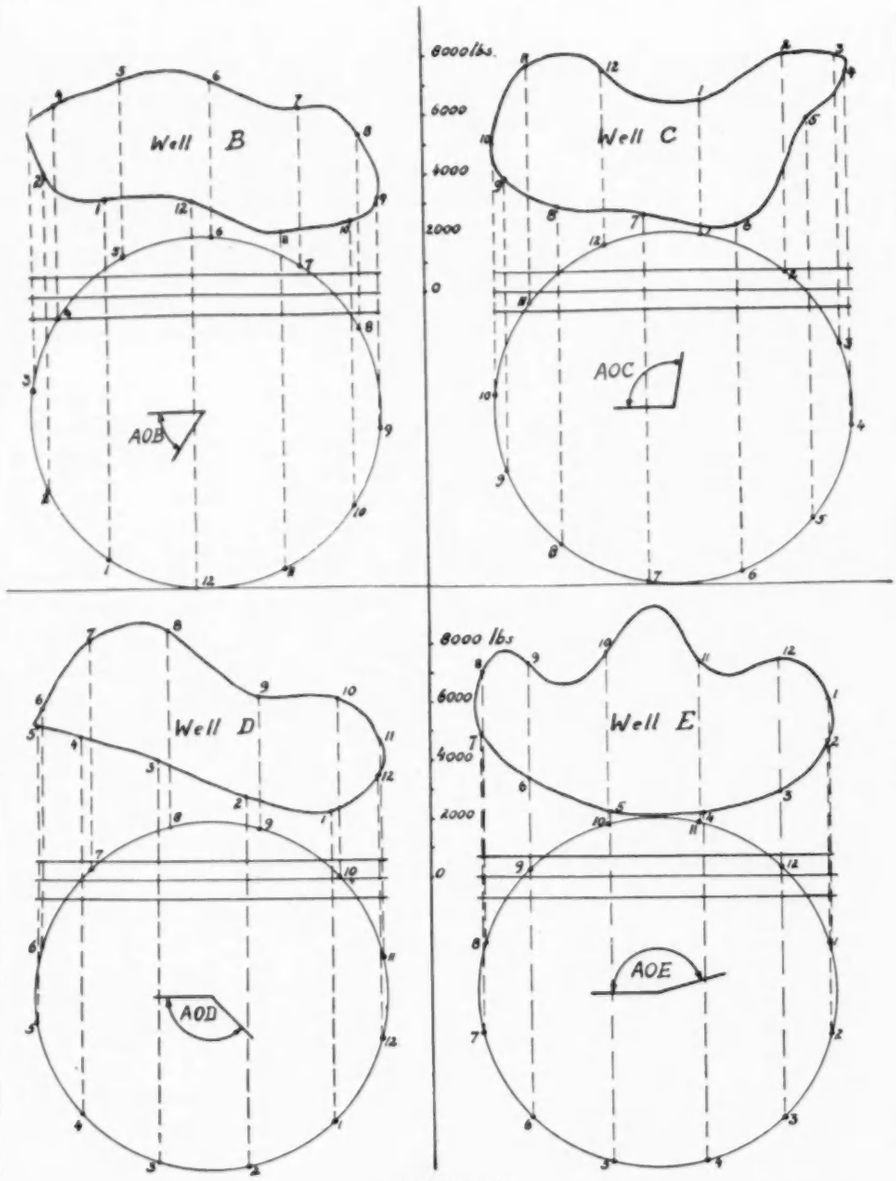

FIGURE 3
Dynamometer cards for wells B, C, D, E and method of determining corresponding crank positions.

horizontal system of forces. The location of the resulting force is given by the point of convergence of the extreme vectors I and VI, for the vertical system and I′ and VI′ for the horizontal system. Drawing respectively a vertical and a horizontal line through these points, the center of application 11 of the resulting force is found. Similar construction can be made for the other crank positions; points 1, 3, 5, 7 and 9 have been so obtained but for the sake of clarity the polygons of force leading to their determination have been omitted from Figure 1. As seen from Figure 1, points 1, 3, 5, 7, 9 and 11 outline an area suitable for the location of the central power. It is seen also that location O, determined by balancing a loaded cardboard as above explained, is a satisfactory location as it is practically in the center of the favorable area. For locations of the central power outside this area, negative torques would occur during the crank rotation and therefore would yield a distorted torque diagram which would be difficult to counterbalance. For the remainder of the problem, position O will be considered as a satisfactory location for the central power.

Counterbalancing the Power

The next consideration will be that of determining how much the power is out of balance and how the off-balance may be corrected.

In order to obtain an accurate idea of the torque during the crank rotation, one must know the efforts which will be required to overcome the added resistance produced by the pull-rod friction. The lengths of the pull-rods may be read from Figure 1 by scaling distances OA, OB, OC, OD and OE. The friction loads are obtained by assuming an average coefficient of friction (0.3 is usually assumed) and is introduced in the following formula:

Friction load = .3×L×W (1)

in which L is the length of the pull-rods in feet between well and central power and W is the weight per foot of the pull-rods.

The maximum load is obtained at Well E and is 9200 pounds; thus ¾-inch pull-rods weighing 1.69 pounds per foot and having a maximum permissible load of 11,000 pounds can be used. Therefore the following friction loads are obtained according to Table 1.

TABLE 1
Friction Loads

Rod	Length, Feet	Friction, Pounds
OA	1720	875
OB	1360	690
OC	1400	710
OD	1220	620
OE	1360	690

The friction load of the pull-rods is added to the well load on the up-stroke and substracted on the down-stroke. Therefore on dynamometer cards of Figures 2 and 3, two new zero lines for each card must be added in order to obtain the load at the crank due to both the well load and the pull-rods load; there will then be an up-stroke zero line and a down-stroke zero line and both are separated from the dynamometer card zero line by an amount given in Table 1.

In order to obtain the torque for each crank position, the resulting loads around the central power

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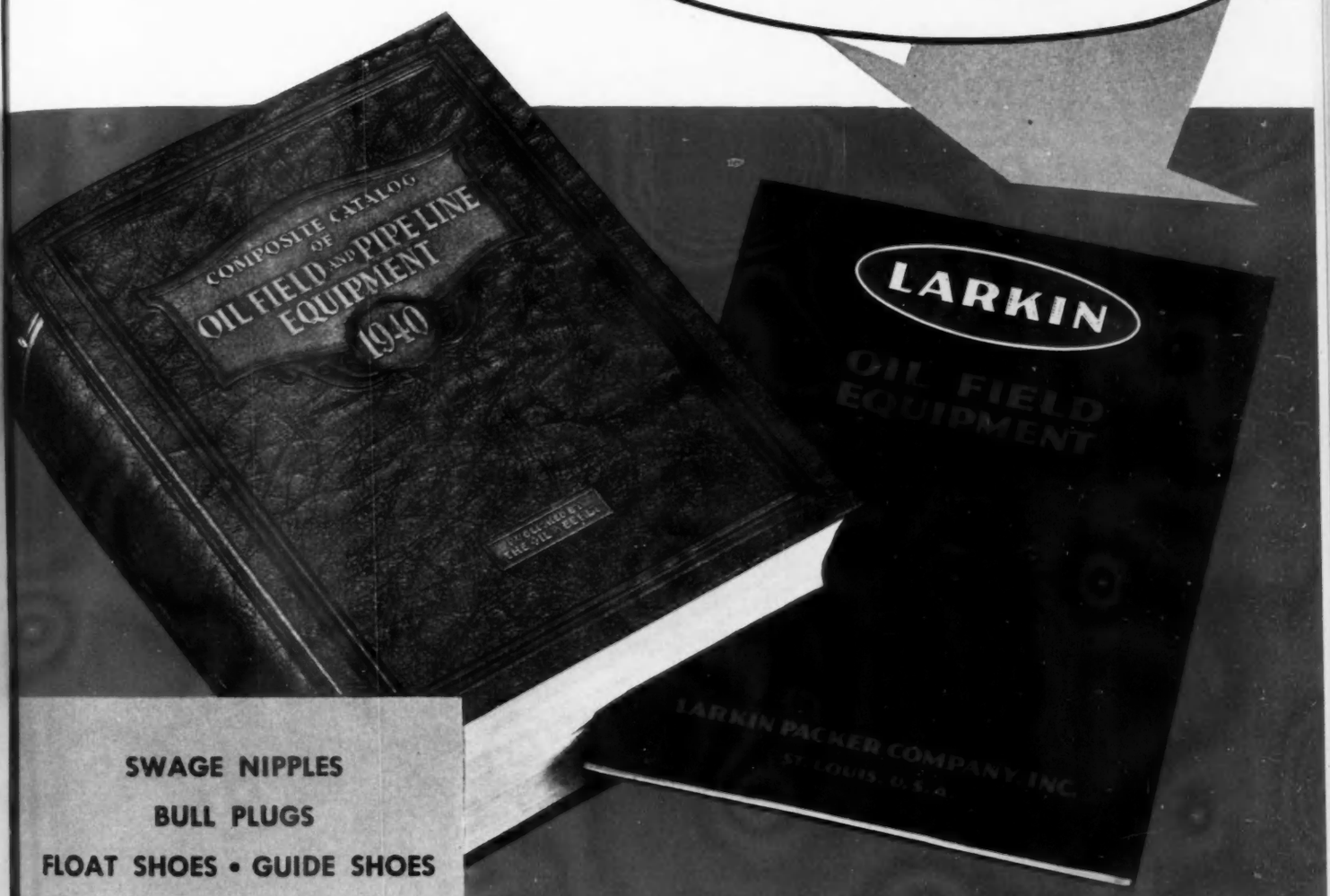
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must be calculated. This may again be done most easily by means of a graphic solution as represented on Figure 5 where the calculation for the resulting force F_5 is indicated. The force components of F_5 are oa, ab, bc, cd and de, each respectively parallel to OA, OB, OC, OD and OE and taken in the direction of the load in each rod and each of a length corresponding to the load as given by the dynamometer cards of Figures 2 and 3, the friction loads in each case being properly taken care of as follows:

for oa: friction added
" ab: friction added
" bc: friction substracted
" cd: friction substracted
" de: friction substracted

In a similar manner, resulting forces F_1 to F_{12} are obtained and the results are indicated on Figure 5 together with the corresponding crank positions.

The torques may now be computed readily as the torque of a force is the product of said force by its lever arm. For force F_5 for instance, T_5 is equal to the product of the crank's length by the component of F_5 taken perpendicular to crank position .05. If the stroke at the power is assumed to be three feet, Table 2 of torques may be computed.

TABLE 2

Crank Positions	Torques Force Components Perpendicular to Crank Positions Pounds	Torques, Feet x Pounds
1	5,900	8,850
2	6,000	9,000
3	5,400	8,100
4	6,200	9,300
5	8,000	12,000
6	10,900	16,350
7	9,300	13,950
8	9,400	14,100
9	9,000	13,500
10	11,400	17,100
11	11,000	16,500
12	8,700	13,050

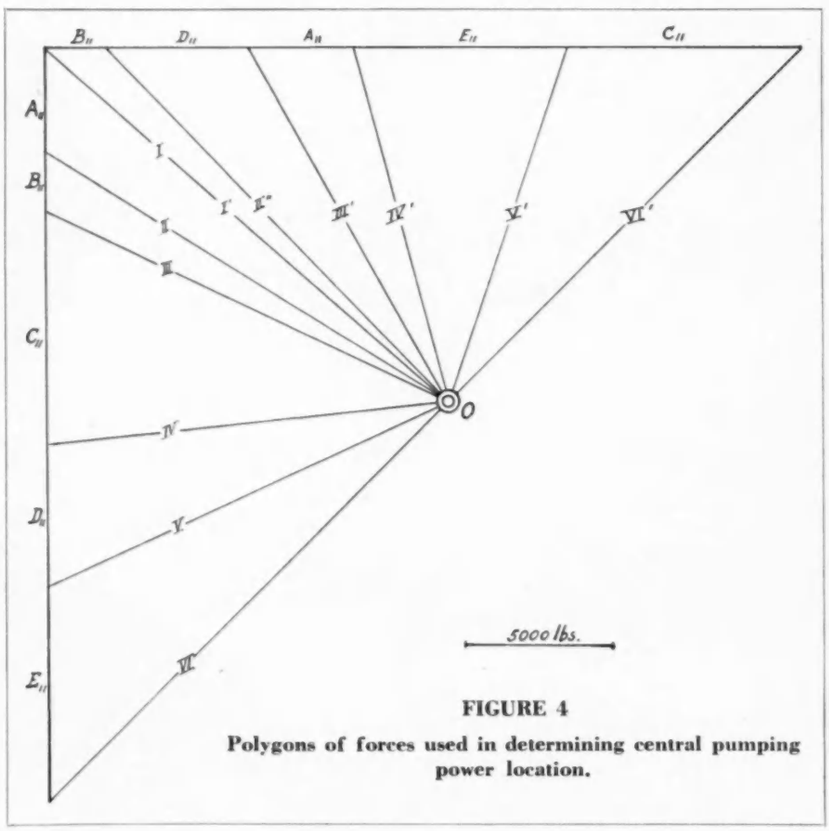

FIGURE 4

Polygons of forces used in determining central pumping power location.

The torques so obtained are plotted to scale along their corresponding crank position in Figure 6 and give curve T_a. It can be seen therefore that the power as located does not give a very good counterbalance as the torque diagram has an elongated and eccentric form. Therefore the operation of the power would not be very smooth, the speed of the crank would not be constant and there would be danger of breakage and shutdown time of some of the wells. By means of oscillating dummy weights it is possible to correct the torque diagram of its defects, to a large extent, according to the following procedure. First, the torque diagram will be corrected for its eccentricity. It is noticed that the torque diagram is off-center along crank positions 3—9 by an amount $ab = T_9 - T_3$. With one-half of ab as diameter, two small circles are drawn with their centers located on line 3 — 9 and touching each other at O. These two circles represent the torque diagram which a suitable dummy weight connected to the crank and oscillating along line oc would produce. The amount of dummy weight necessary is calculated by the following formula:

$$\text{Dummy weight} = \frac{ab}{2} \times \frac{1}{\text{Dummy lever arm}} \qquad (2)$$

During half of the crank revolution, the dummy will store energy and during the other half, the energy will be released and will help pumping; thus one of the torque circles is considered as positive and the other as negative. The effect of the dummy counterbalance may be calculated by subtracting from torque T_a along the crank positions 7, 8, 9, 10 and 11 an amount equal to the intercept of the same crank position on the negative torque circle. Similarly, along crank positions 1, 2, 3, 4 and 5, a similar intercept on the positive torque circle must be added to T_a. In this way, a modified torque T_b is obtained, which, as can be observed on Figure 6, is fairly well centered but is still somewhat elongated. In order to correct for elongation, a special counterbalancing device is used such as a dummy weight oscillating at 45° to the direction of maximum elongation and coupled with a multiplying gear of ratio one to two. For one revolution of the crank, the dummy weight will thus make two complete oscillations. Therefore, the polar equation of the torque values around the power is given by the following formula:

$$T = \text{Dummy weight} \times \text{Lever arm} \times \cos 2\alpha \qquad (3)$$

where α is the angle of rotation measured from the direction of maximum elongation. In plotting the torque diagram due to such a combination (reduction gear—dummy counterbalance) one will obtain a torque diagram in the form of a four leaf clover as represented on Figure 6; two opposite leaves having the same sign, alternatively positive and negative. The introduction of this counterbalancing combination results in torque diagram T_c which is well centered and sufficiently circular for practical purposes

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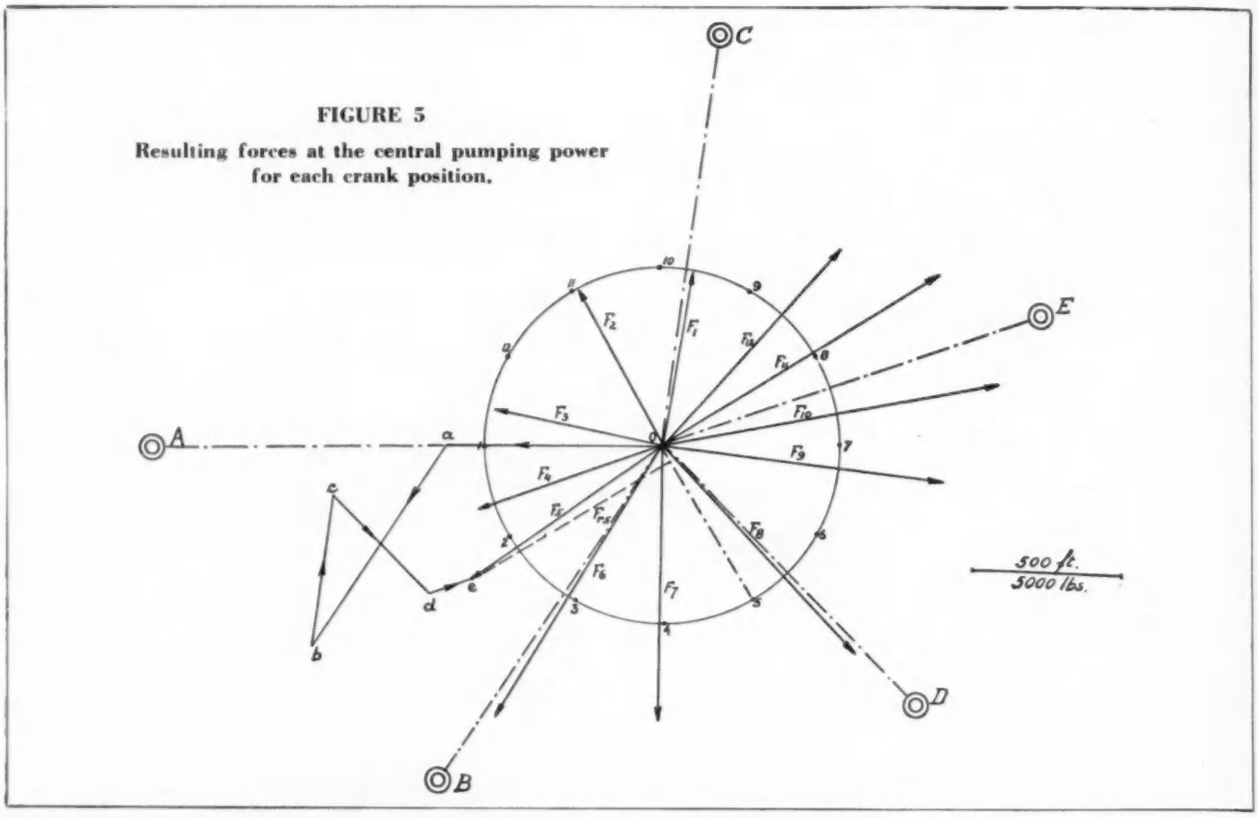


FIGURE 5

Resulting forces at the central pumping power for each crank position.

in order to obtain a smooth running power with minimum torque.

By way of example, it is interesting to calculate the amount of power saved by the above counterbalancing combination in the example cited. It can be observed that the maximum torque is reduced from a maximum of 17,100 feet × pounds to 14,500 feet × pounds, which, at a pumping speed of 10 strokes per minute, entails a reduction of 5 horsepower in the power necessary to drive the central power.

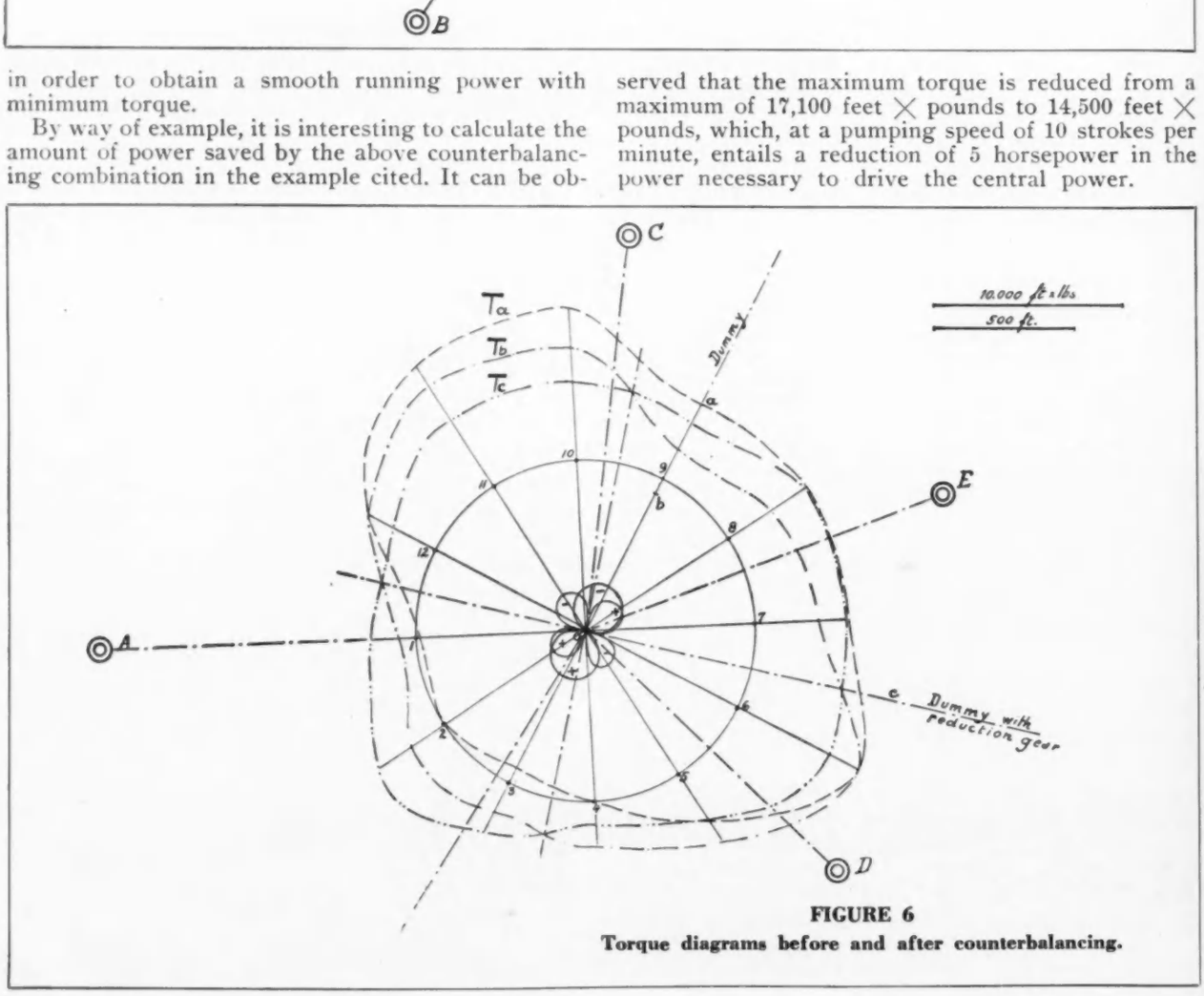


FIGURE 6

Torque diagrams before and after counterbalancing.

DRILLING CONTRACTORS' NOTEBOOK

Helpful Suggestions For Those Interested In Drilling Methods

Operating Ideas Maintenance Hints New Rig Hook-ups

Published as a regular feature of THE OIL WEEKLY

1. DRILLING

Spare Draw Works Connected on Derrick Floor for Emergency Service

WHAT would happen if the engine operating the draw works should blow a head gasket just as the drill pipe was started out of the hole? The kelly would be in the rat-hole, and no circulation available to keep the suspended cuttings moving.

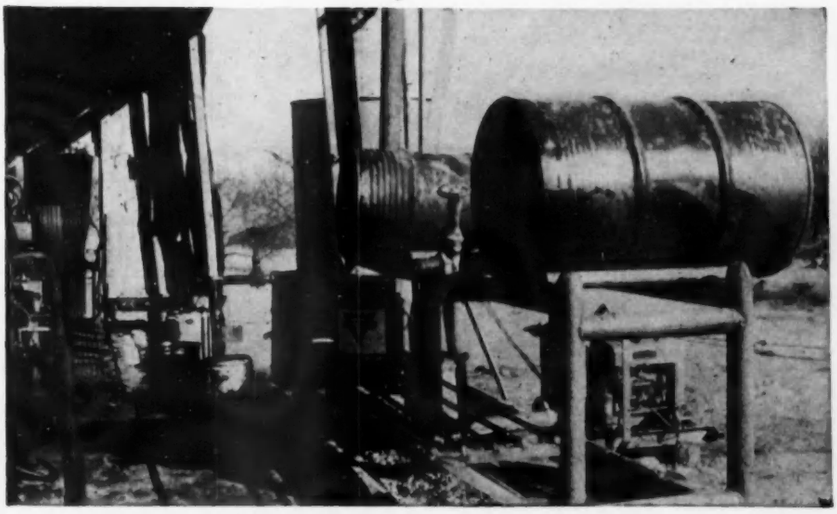
A California operator anticipating such a situation installs two draw works on the same derrick floor. Steam is used largely as power and the usual type rotary tools are employed. A discarded unit, not ready to be junked, is held in active service and installed on the opposite side of the floor. Live steam pipes are connected and tested frequently. Instead of deadending the drilling cable to derrick sills, the dead end is attached to the drum of the draw works of the stand-by unit and the brake tied down to prevent slipping.

If the regular draw works should fail at a critical moment, the driller can lock the brake and immediately start the spare, continuing the job of lifting the pipe without allowing sufficient time for freezing.

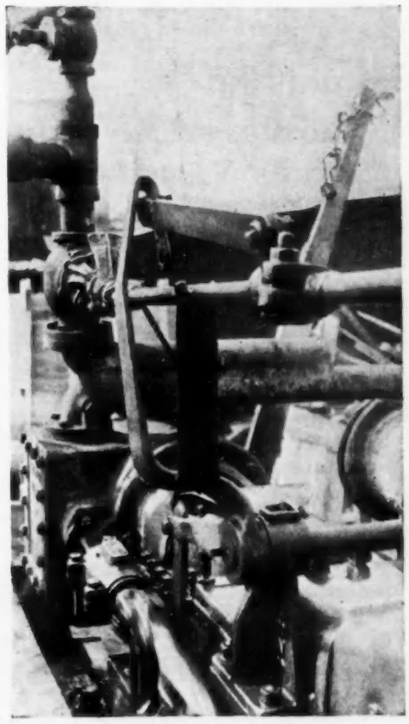
2. LUBRICATION

Drum Rack Sets on Derrick Floor

A CONVENIENT rack for drums of lubricants may easily be made of 2-inch pipe. The rack illustrated, accommodating 4 standard drums, is equipped with a sucker rod shelf below the spigots for resting the measuring cans. Below the rack is a trough of sand to absorb occasional drops of oil, preventing them soaking into the planking of the derrick floor. With the exception of the sand trough, the rack is a complete unit and will withstand rough handling when hauling on a truck.



This oil drum rack, installed on the derrick floor, is made of 2-inch pipe.



This bracket, welded to the horizontal section of the reverse lever, supports the throttle rod and saves vibration wear on the throttle valve and universal joint.

3. ENGINE CARE

Bracket Eases Load On Throttle Valve

WELDED to the offset in the reverse lever and carrying a U-shaped head which closely fits the throttle rod, a simple bracket relieves the throttle valve and its adjacent universal joint of the weight of the long throttle rod.

When in the "go ahead" position, the weight of all but the throt-

tle half of the universal is supported by this bracket. All vibration set up in the long rod by operation of the engine is absorbed at the bracket and none passed on to cause rapid wear of packing, throttle stem or the blocks and pins in the universal.

When the rod is pulled out to reverse the engine, the motion of the reverse lever swings the U-shaped support in a wide arc away from the rod without binding; rising again to support the rod as the reverse gear is returned to normal running position.

4. HOUSING

Louvered Section Gives Ventilation

A DEPARTURE from the usual tightly-enclosed field pump house has been made at the Lyon & Nealy lease in the Lisbon, Louisiana, field where side sheets forming the walls are terminated 12 inches below the eave line. The aperture thus left is partly closed by 4-inch-wide battens to prevent unauthorized entry into the house.

This construction permits heated air from the power unit—in this instance a multi-cylinder high-speed gas engine with attached fan and radiator system—to find its way out through the louvered walls, aided by any breeze which may be blowing through the same openings.

For winter use, the openings may be closed with 12-inch planks, nailed or screwed into place over the battens forming the grill of the louveres. When thus enclosed, the room is as tight and weather-proof as if constructed of solid walls.

A louvered section below the eaves provides improved air circulation through this field pump house.

This muffler, made by the company welder, reduces the sound of exhaust from multi-cylinder gas engines on a rig in the Oklahoma City field.

5. ENGINE CARE

Muffler Reduces Exhaust Noise

A MUFFLER made by the company welder from two 42-inch lengths of 15-inch pipe has been installed at a rig of Skelly Oil Company in the Oklahoma City field to reduce the sound of exhaust from multi-cylinder gas engines. The resultant drums are joined with two 6-inch nipples about 14 inches from either end. An 8-inch nipple with a bolted flange is attached to one side of one of the 15-inch drums for connection with the exhaust pipe. A 6-inch nipple and welded ell are attached to the top side of the second drum, leading to a 20-inch open-top drum to release the gases to the atmosphere. Expansion capacity of drums and the connecting pipe is sufficient to muffle the noise of the engine low enough to be unobjectionable to occupants of nearby homes.

6. RIGGING UP

Hose Tie-In Cuts Down Fittings

OVERTON REFINING COMPANY uses a section of rotary hose to tie pumps to the boiler water lines. The practice eliminates many fittings and provides maximum flexibility between boiler-feed pump manifold and leads to the boilers.

No matter how severe the vibration of pump unit or how serious the settlement of boilers or pump platform, the flexible hose absorbs the shift without adding to the strain on any unit.

HIGHLIGHTS IN THE WEEK'S NEWS

Reserves

Large increase made in new proved reserves

New petroleum reserves proved during 1939 were almost double production for the period, according to the American Petroleum Institute's Committee on Petroleum Reserves. The committee conservatively estimates new reserves at 2,399,122,000 barrels, providing a net increase of 1,134,866,000 barrels in known underground stocks after deducting 1,264,256,000 barrels produced in 1939. The proved-reserve inventory on January 1, 1940, stood at 18,483,012,000 barrels, a new all-time high. A story on the committee's report appears on page 52 of this issue.

Divorce

Patman amends chain tax bill to include filling stations

Apparently seeking to attract the support of proponents of divorce of marketing from other activities in the oil industry, Representative Wright Patman of Texas, last week offered major amendments to his chain-store tax bill, one of which would bring filling stations within the scope of the measure.

Whether his move would be successful could not immediately be determined, for representatives of groups favoring divorce said they had not been consulted about the inclusion of filling stations in the ranks of chains condemned to death and, in some instances, expressed doubt whether this was the best way to bring divorce about.

Other amendments proposed by Patman as the House Ways and Means Committee opened hearings on his bill were designed to ease the impact of the "death tax" upon chain organizations and to make it clear that the legislation is aimed only at the large interstate chains, while giving them ample time in which to wind up their businesses and dispose of their properties.

Despite the fact that the committee granted the hearings, there was no indication at the capitol that any action would be taken this session on the measure, which originally would have imposed taxes ranging from $50 to $1,000 upon each store in a chain and, at the end of two years, multiply the basic tax by the number of states in which the organization operated.

The amendments would entirely eliminate from taxation chains of not more than 50 stores located in the same state as the principal place of business or within a radius of 100 miles; halve the tax rates, making them run from $25 to $50 per store, and postpone from two to seven years the period to elapse before the "death" provision, multiplying the tax by the number of states in which a chain operated, would go into effect.

The hearings on the bill are being conducted by a subcommittee which is said to be antagonistic to the measure, and predictions were made that they would run for weeks and still be in progress when Congress adjourns.

Tankers

West Coast congressman fears spread of tanker rate hike

Fears that tanker conditions now existing in the Atlantic will be extended to the Pacific Coast states will serve to bring West Coast support for the Harrington resolution for a Congressional investigation of tanker and barge rates, it was declared last week by Representative John M. Coffee of Washington.

Should such a situation arise, Coffee asserted, it would stifle Washington industry and place a heavy burden upon users of fuel oil.

"On the Pacific Coast," he said March 28, "our fuel oil consumers, our merchant marine and our manufacturers who depend upon the merchant marine, stand at the mercy of the major oil companies through their control of oil tankers. Rates fixed bear little relation to cost but, like on the East Coast, are set so as to exact the greatest possible amount from the public.

"One major oil company on the Pacific Coast already has transferred several of its tankers to Panamanian and Canadian registry. I fear that these major oil companies are getting ready to do the same thing on the West Coast that Rockefeller's companies have already done on the East Coast. Tanker rates on the East Coast have increased over 400 percent since last August. Should this take place on the Pacific Coast it will stifle our Washington industries and place a heavy burden on the home and building owners who depend upon fuel oil.

"The investigation should be extended to include a review of the effect upon American seamen who are thrown out of work by this transfer of American ships to foreign registry."

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Allowables

April allowables 8.4 percent over indicated market demand

Regulated states continued to flout the United States Bureau of Mines estimate of demand for domestic crude by setting April allowables that are, in the aggregate, 8.4 percent in excess of the indicated need for crude. In the new quotas there was no promise that the margin of excess production would be smaller than in March, when an excess of 213,000 barrels at the first of the month for the eight states grew to 250,000 barrels at the month's end. Indicated excess at April 1, 249,066 barrels for the prorated states, may swell to 280,000 barrels before the month is over.

Notable among the changes made in the Bureau estimate was an increase of 50,300 barrels in the Illinois allotment, an adjustment that should compensate for the gains the state is expected to make in the next month or two, and one that should hold nominally uneconomic production for the nation below the March peak of approximately 350,000 barrels.

Among the controlled states, Arkansas, Kansas, Louisiana and New Mexico acted to increase the excess over the federal forecast, Oklahoma continued in accord, and Texas and California reduced the difference—the former by a considerable amount after sizeable increases in storage had attested the absence of markets for the heightened March allowables.

Texas and California

The Texas allowable of 1,514,433 barrels represents a 52,433-barrel reduction

April Allowables 8.4 Percent Over Indicated Demand

STATE	Bureau of Mines Estimate of Demand	State Allowable Beginning of Month	Excess or Deficiency of State Allowable	Percent Excess or Deficiency
Arkansas	64,500	70,000	+ 5,500	+ 8.5
California	590,000	592,000[1]	+ 2,000	+ 0.3
Kansas	151,000	170,000[2]	+ 19,000	+12.6
Louisiana	257,000	284,133	+ 33,133	+12.8
Michigan	63,000	62,000	— 1,000	— 1.6
New Mexico	100,000	114,000	+ 14,000	+14.0
Oklahoma	413,000	413,000	.....	.....
Texas	1,332,000	1,514,433[3]	+182,433	+12.1
Total eight states	2,970,500	3,219,566	+249,066	+ 8.4
Other states	579,500	.....	.....	.....
Total United States	3,550,000	.....	.....	.....

[1] Recommendation of Central Committe of California Oil Producers.
[2] March allowable continued in effect until hearing.
[3] Daily average, considering general shutdown April 1, and 12 shutdown days in East Texas field.

from the record current quota of 1,566,877 barrels. The cut was accomplished by ordering an April 1 shutdown in all fields and resulted in a margin of 182,443 barrels over Bureau recommendation. This excess, 12.1 percent, although greater than the initial March overallocation of 159,770 barrels, can be regarded as anticipation of increases which the Bureau will assign in subsequent months. Reductions were made in the allowables to 16 fields, while the East Texas field was given an 11,000 barrel increase, bringing the daily average to 414,197 barrels.

The Central Committee of California Oil Producers recognized the uncertain situation which has prevailed since the recent price cut by holding allowables at the March level of 592,000 barrels, while the federal forecast was raised 2900 barrels to 590,000 barrels.

Oklahoma, Louisiana and Kansas

Oklahoma, the only state to cling consistently to government advice in the past several months, set April allowable at 413,000 barrels daily. At this level both state allocation and federal estimate are 7300 barrels below those of March.

North Louisiana fields have been assigned 60,883 barrels daily under an April order, while 223,250 barrels will be allowed in the southern fields. The total allowable, 284,133 barrels, is 33,133 barrels, or 12.8 percent above the Bureau allotment, which was increased 3800 barrels. The allowable boost of 6721 barrels comprises a 7174-barrel increase in South Louisiana fields, and a 453-barrel reduction in the northern fields.

The March allowable of 170,000 barrels daily will continue in effect until a hearing is held. At 170,000 barrels the proration quota is 19,000 barrels, or 12.6 percent over Bureau recommendation, compared to a March excess margin of 9.5 percent over a Bureau figure 2900 barrels greater than that for April.

Others

New Mexico March allowable of 114,000 barrels was held in effect despite a drop of 3200 barrels in the federal forecast. The present excess, 14,000 barrels, is the greatest since last spring.

Arkansas March allowable, 70,000 barrels, was held over for April, while the bureau estimate was cut 1000 barrels. The state is 5500 barrels, or 8.5 percent, above the bureau.

Maximum production in Michigan for April has been estimated by the Department of Conservation at 62,000 barrels, while bureau recommendation is for 63,000 barrels. A 3000-barrel drop in expected production from March levels will be partially handled by reductions in allowables to the Redding and Freeman fields, totaling 1100 barrels.

California continues efforts to curb drilling; allowable same

Maximum individual quotas in California for April have been set by the Central Committee of California Oil Producers at not to exceed 178 barrels daily per well. The state quota for April was set at 592,000 barrels daily, unchanged from the March figure. In March, the maximum well allotment was 182 barrels daily.

Balloting on selection of a new Central Committee will take place this month, a special election committee having recommended creation of one new district and the election of a new member from the state at large to increase membership to 30. At present there are 28 members of the Central Committee, 25 representing producing districts and 3 representing the state at large. The new producing district will give representation to the fields of Rio Bravo, Greeley and Wasco in the San Joaquin Valley.

The new well subcommittee reported that discussions have been held with various major companies looking toward a reduction in drilling activity over the state and that assurance has been given by this group of support to the program. The committee plans to meet with representatives of 7 large independent units now numbered among the most active developers in the state to enlist their support of a program for reduced drilling operations.

Since inauguration of a uniform proration formula last June, new well completions have added new potential each month far in excess of the decline of old wells, resulting in continued reduction both of top well allotments and of the power factor applied to intermediate wells, and bringing a steady decline in allotments to wells of a given size over and above marginal classifications.

Texas cuts back from March; continues above bureau figure

The Texas Railroad Commission has fixed the April allowable for Texas at approximately 1,514,433 barrels daily. This is a decrease of 52,444 barrels from the March allowable, and is 182,433 barrels above the estimated consumer demand of 1,332,000 barrels as computed by the United States Bureau of Mines.

The reduction was accomplished by reducing allowables in 16 fields and by closing fields.

East Texas got an increase of approximately 11,000 barrels a day, because the field is shut down for 12 days during April instead of 13 as in March. The total field allowable is 690,329 barrels which will be produced in 18 days, the same number of days that were allowed in March. However, to determine daily average the total monthly production is divided by 30 for April instead of 31 for March, bringing the daily average allowable for the field, after shutdown deductions, to 414,197 barrels. The field is to be closed on April 1, 6, 9, 10, 13, 16, 17, 20, 23, 24, 27 and 30.

The order providing for the statewide shutdown is carefully worded to prevent opening wells indiscriminately, although exceptions are made for wells which might be injured by closing them in. However, the commission provided that if the well is not closed in, it must have its flow reduced sufficiently to permit only 29 days production for the month.

The order was signed by Commissioners Jerry Sadler and Lon A. Smith. At the time the order came out, Commissioner Ernest O. Thompson was in Austin, but he said that he had not seen the order nor had not passed on it.

Several operators complained that the allowables for other fields were too high and the state allowable total was far too high, but none of them appeared to have requested cuts for their own fields. Some complaints were received because certain field allowables had been raised.

Ethyl Gasoline Corporation loses in anti-trust suit

The Department of Justice won a final decision in its anti-trust suit against Ethyl Gasoline Corporation when the Supreme Court affirmed a decision of the District Court for the Southern District of New York restraining the company from violations of the Sherman Act.

As a result of the decision, it was said by interested observers in Washington, the way has been paved for the filing of a number of treble-damage suits which are said to have been prepared for some time, awaiting only the final action of the Supreme Court.

In its opinion, delivered by Associate Justice Stone, the court held that the company had used its patents to control jobbers' prices and suppresss competition among them, the extent to which its dominion over the jobbers' business goes beyond its patent monopoly being emphasized by the fact that the prices and market practices sought to be established were not those of the company but of the refiners.

"Since the unlawful control over the jobbers was established and maintained by resort to the licensing device, the decree rightly suppressed it even though it had been or might continue to be used for some lawful purposes," it was declared. The court was bound to frame its decree so as to suppress the unlawful practices and to take such unreasonable measures as would preclude their revival.

PIPE LINE NEWS

Propose Louisiana-Tennessee natural gas pipe line

Proposed organization of the Tennessee Gas & Transmission Corporation to construct a natural gas pipe line from Louisiana fields to serve towns in Central and East Tennessee was announced at Chattanooga last week by Curtis B. Dall, New York broker. Dall said he and John E. Buckingham, former president of the Kentucky Bankers Association, were trustees for a syndicate composed of Nashville, Chattanooga, Knoxville and middle Tennesseee business men.

The firm, Dall said, will be an $18,000,000 venture, and will present a financing plan in conjunction with "a group of well-known investment banking firms" that will meet the approval of the Securities Exchange Commission.

No information was given as to the exact source of the gas, but indications were that it would come from near Shreveport. An 800-mile line would be necessary for such a project.

Transit and storage to loop 68 miles with 8-inch

Transit & Storage Company will add 68 miles of 8-inch loop to its crude system between Cgynet, Ohio, and Sarnia, Ontario, Canada. The company, subsidiary of Imperial Oil Company, has two 6-inch lines between the two points. The increased line capacity will permit increasing capacity of Imperial Oil Company's Sarnia refinery from 25,000 to 30,000 barrels daily.

Treasure State acquires Ohio's interest in gas line

Treasure State Pipe Line Company has acquired half interest in the gas carrier from the Kevin-Sunburst field of Wyoming, serving the community of Sunburst and the plant of the International Refining Company, from The Ohio Oil Company for a consideration of $22,000. The line also serves the towns of Oilmont and Ferdig. It was one of the first laid in the Kevin field. The Ohio Oil Company's interest was obtained in 1927 when a 12-mile extension connecting the field with the town of Sunburst was planned.

Wade City to have three pipe line outlets

Three pipe line outlets are to be provided for the recently-opened Wade City field, northeastern Jim Wells County.

Continental Oil Company now is taking crude, and will shortly extend its Jim Wells County system several miles to tie in with the new area.

Southern Minerals Corporation will extend its line from the Reynolds field. A 10,000-barrel tank already has been constructed and a portion of the gathering system is under way through the field. This company, as well as Continental Oil Company, has a pipe line to deep water terminal at Corpus Christi.

The third project is by the C. Andrade, III, interests of Dallas, running crude from a line into the Jim Wells County sector from Corpus Christi. Negotiations are now under way for a supply of crude.

Plant to provide outlet for Tussy field, Oklahoma

Winkler & McQueen, Inc., Duncan, Oklahoma, have begun construction on a 700-barrel refinery in the Tussy field, Carter and Garvin Counties, Oklahoma. The operators produce over 1000 barrels daily, but will be general purchasers when the plant is completed.

Seminole, Gaines County, has second pipe-line outlet

Seminole field, Gaines County, was given its second pipe-line gathering system late last week through completion of Atlantic Pipe Line Company's gravity lines. Magnolia Pipe Line Company began running oil from the field a week earlier. Facilities of both companies are used in making deliveries to their respective tank farms at Midland, Texas. A joint tariff specifies a field gathering charge of 5 cents per barrel, while local deliveries to Midland are 5 cents extra. The trunk line tariff on crude moving from Seminole to the Gulf Coast terminals of each is 22½ cents per barrel, or the same as that applying to other West Texas fields.

Skimming plant at Prewitt provides New Mexico outlet

Petroleum Products Refining Company has placed in operation a 2000-barrel daily capacity crude skimming plant at Prewitt, New Mexico, using crude delivered by tank trucks from the Hospah Dome pool, McKinley County. Ray McGlothlin, former refinery superintendent for the Onyx Refining Company, Abilene, Texas, is head of the company and stock interest in held by a group of Amarillo oil men.

The outlet for Hospah production will pave the way for more development, restricted since the discovery was completed in July, 1927. The crude yield of the area is rated at 800 barrels daily and the oil averages 30-gravity with a low sulphur content.

Allowable cut not to affect Wasson pipe-line proration

Pipe-line proration will remain in effect in the Wasson field, leading drilling center in the Southwest, in the face of a reduction in allowable from 38,812 barrels to 35,000 barrels daily, effective April 1. The two purchasers of outside oil restricted runs to 75 percent of the allowable on February 15 and March 1, and for some weeks have been unable to connect with new completions because of pipe line congestion. These wells without a market will be accommodated first, then if pending completions fail to utilize the available pipe line room the cut in runs will be lowered, according to reports.

Shell Pipe Line Corporation is taking steps to boost the capacity of its 6-inch carrier from Wasson to Hobbs, New Mexico, from 12,000 to 13,000 barrels daily by adding extra booster units. However, the company has a congested line between Hobbs and Wink stations, and is negotiating for diversion of 2700 barrels of its Monument runs through The Texas-New Mexico Pipe Line Company's system on a common carrier to Wink station and tank farm.

Propose line from Corpus to East White Point field

Southern Minerals Corporation is preparing for a survey from its terminal at Corpus Christi across Nueces Bay to the East White Point field, San Patricio County. It will become a purchaser in the area.

Union Oil Company has twelfth tanker in service

Union Oil Company of California has placed in service its new tankship, Victor H. Kelly, twelfth unit in the company's tanker fleet. It is a sister ship of the L. P. St. Clair, put into service last March. Cargo capacity is 102,000 barrels, with tank space divided into compartments to facilitate the transportation of many grades of crude.

NRLB orders Texas operators to stop opposing labor union

The National Labor Relations Board last week ordered McAlbert Oil Company and D. B. McDaniel, drilling contractor, Barbers Hill, Chambers County, Texas, to cease discouraging affiliation of their employes with the Oil Workers International Union, and to offer reinstatement with two years' back pay to J. H. Spear, electrician and roustabout, and paved the way for a secret election among the employes to determine whether they shall be represented by the union for collective bargaining.

The election, however, is not to be held until "the effects of the companies' unfair labor practices have dissipated."

The board held that Spear, discharged in March, 1938, had been dismissed because of his union activities, although the companies contended it was because of an insufficient amount of electrical work to justify his retention.

It was also held that the companies had interfered with, restrained and coerced their employes in the exercise of the rights guaranteed by the National Labor Relations Act by interrogating them regarding their union activities, "by remarks made to their employes derogatory to labor organizations and particularly the OWIU, and by express and clearly implied threats to discharge their employes provided they continued their union activities."

The National Labor Relations Board last week dismissed a petition of the Oil Workers International Union to certify that organization as the collective-bargaining representative of the employees of Tucker Oil Company, Houston.

The petition was filed in an effort to overcome the results of an election held by the employees February 24 at which they voted 51 to 25 against affiliating with the union.

Engineering Trends Disclosed At Southwestern A.P.I.

DESPITE remarkable technological advancements made in recent years in the industry many problems remain to be solved, and technicians in the future must consider economies as well as engineering phases. Therefore, the field of technical research has been expanded. This was a thought expressed at the Southwestern District meeting of the American Petroleum Institute's Division of Production, held in Houston last week. Speakers also stressed supervisor training as an important executive duty, and delivered a number of widely varied technical papers.

L. A. Ogden, The Pure Oil Company, Fort Worth, was elected chairman of the district for the ensuing year. He succeeds E. P. Hubbard, Gulf Oil Corporation, Houston.

Six vice chairmen were elected, each to serve an area within the district, as follows:

For the Gulf Coast area, E. P. Hayes, The Texas Company, Houston.

For Southwest Texas, Al Buchanan, drilling contractor, San Antonio.

For North and West Texas, G. A. Poole, Gulf Oil Corporation, Odessa.

For Arkansas-North Louisiana, R. O. Garrett, Arkansas Fuel Oil Company, Shreveport.

For New Mexico, Edgar Kraus, Atlantic Refining Company, Carlsbad, New Mexico.

For East Texas, R. M. Bass, Sinclair Prairie Oil Company, Troup, Texas.

The new secretary-treasurer is E. L. Rawlins, Union Producing Company, Shreveport. He succeeds J. U. Teague, Hogg Oil Company, West Columbia.

E. P. Hubbard, the retiring chairman, was made chairman of the advisory committee, which consists of the following members:

L. V. Barrows, The Texas Company, Houston; E. H. Blum, The Atlantic Refining Company, Dallas; A. R. Campbell, Mid-Continent Oil & Gas Association, Shreveport; Monroe G. Cheney, Anzac Oil Corporation, Coleman, Texas; S. A. Childress, Rio Bravo Oil Company, Houston; J. D. Collett, Sr., O'Keefe & Collett Company, Fort Worth, Texas; A. J. Cunningham, Standard Oil Company of Texas, Houston; Charles Fitzgerald, Sinclair Refining Company, Fort Worth; R. G. Hamaker, Reed Roller Bit Company, Houston; J. L. Hamon, Cox & Hamon, Inc., Dallas; C. W. Hughes, Arkansas Natural Gas Company, Shreveport; J. S. Ivy, Union Producing Company, Shreveport; R. B. Jones, Panhandle Refining Company, Wichita Falls; E. A. Landreth, Landreth Production Corporation, Fort Worth; A. G. Levy, Fohs Oil Company, Houston; J. J. Frommer, The Ohio Oil Company, Houston; Harry Leonard, New Mexico Oil & Gas Association; A. M. McCorkle, Stanolind Oil & Gas Company, Houston; R. S. McFarland, Seaboard Oil Company, Dallas; J. R. McWilliams, Standard Oil Company of Louisiana, Shreveport; L. M. Moffitt, Triangle Drilling Company, Shreveport; W. S. Morris, East Texas Engineering Association, Kilgore; L. A. Ogden, The Pure Oil Company, Fort Worth; Gordon Richmond, Hughes Tool Company, Houston; J. A. Ritter, Sun Oil Company, Dallas; C. F. Roeser, Roeser & Pendleton, Inc., Fort Worth; A. H. Rowan, Rowan & Nichols Oil Company, Fort Worth; E. Rubsamen, Trinity Drillers, Inc., San Antonio; J. H. Russell, Gulf Oil Corporation, Houston; E. H. Salrin, Tide Water Associated Oil Company, Houston; J. R. Suman, Humble Oil & Refining Company, Houston; C. E. Sutton, The Pure Oil Company, Houston; T. E. Swigart, Shell Oil Company, Inc., Houston; Murray Sells, Sells Petroleum, Inc., Gladewater; C. G. Staley, Lea County Operators Committee, Hobbs, New Mexico.

Abstracts of the papers presented at the meeting follow:

Gravel Packing Oil Wells In the Gulf Coast Fields

By M. L. Cashion and F. B. Markle
Gulf Oil Corporation

Gravel packing has been used in completing water wells for many years, but it has been applied to oil wells only recently.

Not only does gravel pack tend to eliminate or minimize sand production, resulting in long flowing life and long efficient pumping life, due to the possibility of deeper pump submergence, but it also minimizes screen cutting because there is less likelihood of partial plugging of the screen which would result in localized high velocities through the few remaining openings. Gravel pack offers the further advantage of supporting overbearing shales, since when sand is produced from the well the reserve gravel moves down to replace sand that has been produced. The gravel also supports the liner against failure due to column action if the liner is set on bottom and against failure caused by vibration if hung off bottom.

In wells in which casing is set above the producing horizon, it is desirable to underream the producing formation to as large a diameter as possible before gravel packing. The surface equipment necessary includes a casing head with side outlets of at least 2 inches inside diameter and a blowout preventor or stuffing box of the stripper type. The graveling equipment is connected to one side outlet in the casing head and the mud pump is connected to the other side outlet. By use of proper manifolding and valves, it is possible to circulate with conventional circulation, reverse circulation with either pump, or to shut the well in completely. Thus the well is under full control at all times.

The equipment used in graveling all wells in the Gulf Coast consists of two 3000-pound working pressure vessels or gravel drums, and a high-pressure pump mounted permanently on a truck with a power take-off unit to operate this pump. The discharge line of the pump is connected to the gravel drums by means of a manifold in which is incorporated the necessary valves to permit the use of one drum for graveling while the other drum is being filled. By means of a control valve part of the fluid is by-passed through the gravel drum where it picks up the gravel and carries it through the discharge hose into the well.

A number of specific examples of Gulf Coast gravel packing and the production and operating results were cited by the authors.

Paraffin Removal from Tubing in Flowing Wells

By J. Daviss Collett, Jr.,
Consulting Petroleum Engineer

Deposition of paraffin in the tubing of flowing wells is brought about either by a reduction in the temperature of the oil, the release of gas from solution in the oil, or a combination of these two. The possibility of preventing paraffin accumulation is slight, since it is necessary at some point to reduce the pressure to atmospheric with the resulting release of gas in solution. Some success, however, has been had in controlling the deposition by introduction of chemicals into the space between the casing and the tubing so that the chemicals are produced with the oil.

There are three methods by which paraffin can be removed. The first is the application of heat, applied by the introduction of steam, hot water or chemical heat. The second method is the use of chemicals, of which there are two classes. One is a solvent and the other an emulsion breaker. The third method is mechanical scraping, of which there also are two types; namely, automatic and manually operated scrapers. In using automatic knives, the well is closed to let the scraper fall to the bot-

tom of its own weight and then the well is opened to bring it back to the surface.

The second method of removing paraffin by mechanical cutting is to run a scraper on a wire line. This method may be broken down into two parts: (1) individual well set-ups and (2) mobile units. The former consists of a small reel operated by hand and permanently mounted on the Christmas tree, a suitable wire line stuffing box, a lubricator permanently mounted on the Christmas tree, the necessary wire line and a string of paraffin tools. The latter method uses the same general tools and equipment as the individual well set-up, with the exception that the reel has some form of power added, and the entire unit is moved from well to well by car or truck. The power is usually either a small gasoline engine of about 2 to 6 horsepower rating or the motor of the vehicle in which it is mounted.

Problems and Responsibilities of Technologists in the Oil Industry

By W. B. Pyron

Gulf Oil Corporation

In the past 20 or 30 years the industry has improved its operating technique to a most remarkable degree. However, as many, or perhaps more, problems must be solved in the future. These problems will be of a different type and undoubtedly more difficult of solution.

A few of the major problems confronting technical men today are:

1. Notwithstanding the astounding improvements made in rotary drilling equipment, rigs and pipe must be developed that can effectively and economically drill 15,000 feet and deeper.

2. One of the greatest problems plaguing the industry today is just partially solved, and that is the large percentage of crude which carries high hydrogen sulphide content. This type of crude, due to its corrosive effect, has destroyed literally millions of dollars worth of equipment. The problem must be solved at the well to avoid tremendous loss in equipment.

3. A new serious problem has been the discovery of fields that produce sodium chloride in solution. The only known method of dealing with this difficulty is very expensive.

4. Much remains to be accomplished in the art of finding producing structures.

5. A great field for research and development lies in the demands for better gasoline, lubricating oils and greases.

6. The problem of salt water and waste disposal is still very expensive and constitutes a heavy burden.

Many additional problems could be mentioned.

Solving these difficulties is a responsibility of the technicians, and present conditions demand that economies be considered in developing methods to handle the problems. Heretofore, technical men have to a large degree had a free hand and have not been burdened with the economic factors in solving operating problems. But technical men in the future will be called upon to consider economic factors more than ever before, and must cooperate to the fullest extent with their managements in all phases of these problems. In this new responsibility, they must consider such things as taxes, rules and regulations of various agencies of government, the safety and welfare of the public as well as of employes, and many other factors now existing or which may arise in the future.

L. A. Ogden, left, new chairman of the American Petroleum Institute, Southwest District Production Division, and E. P. Hubbard, retiring chairman.

The Development of Some of Our Concepts of Fundamentals Governing Petroleum Production Practices

By E. DeGolyer

Professor of Geology, University of Texas

Waste occurs when oil and gas are produced less efficiently than according to the standards of good production practice prevailing at the time they are produced. The industry has progressed slowly but far in improving its production practice. What was good practice yesterday may be wasteful today. We are producing oil about as well as we know how now, but when one regards the history of the development of some of the most fundamental concepts governing production practice, he must be impressed by the comparatively recent dates at which some of the most important of them were discovered.

The producing branch of the petroleum industry existed 5 to 10 years before it learned to shut-off water. It was at least 50 years old before it had learned to cement and make its water shut-off a good job, and it was less than 10 years ago that the invention of the gun perforation made possible the present precise manipulation of cementing practice.

It had always known that gas occurred in solution in oil, but it was not until 1913-1920 that it really realized the functional importance of such solution. Today, one of the most important concepts controlling production practice, and the one upon which most conservation practice is based, is that the gas produced by a properly completed well generally and for the most part occurs in solution in the oil in its original underground condition. We now know that such an original solution has a lower viscosity, lower specific gravity, and lower surface tension than the crude oil in the flow tanks after gas

separation, and that it is the expulsive action of such gas expanding from solution for the most part which causes oil to flow to the well bore and then to the ground surface.

There is nothing more important in petroleum engineering than a definite knowledge of the pressure at the bottom of an oil well, for such data are fundamental in determining the most efficient methods of recovery. Yet the bottom-hole pressure bomb was invented only in 1926 and was not generally available until 1929 or 1930.

It has been only within the last few years that the industry has begun to learn that the pore space of the oil-producing formations, even around the best oil well, is not entirely filled with oil in the original state but contains water in amounts varying from 10 to 50 percent. As a result of this discovery, we may note that all previous estimates of the percentage of oil recovered from a sand and the percentage of oil left in the sand and not recoverable have been wrong.

Supervisor Training, an Executive Problem

By H. H. Anderson
Vice President,
Shell Oil Company, Inc.

Today, the oil industry looks to the supervisor, which includes such persons as farm bosses, foremen, section heads, superintendents, and all department managers directing activities of other employes, not only for maximum productivity but also for the building and maintenance of good will among employes. His historic duties of work direction have been amplified by newer responsibilities to reflect and interpret management to his men and their reactions back to management. The leadership of men in industry today calls for understanding of men as an individual, of human relationships in society, and the form of business enterprise which operates under the principles of American democracy.

It is said that the two most important requirements of a successful supervisor are: That he establish and maintain good relations with his men, his associate supervisors, and his bosses; and that he understand and know how to interpret company policies and the reasons for orders. Both of these are in addition to the requirement that he know the technique of the operations which his men perform.

It is in recognition of these facts that executives today are becoming more conscious of the need for definite programs of supervisor training. The "conference method" is the most successful and more universally accepted of the several methods developed to train supervisors. As distinguished from the informational meeting where information is given out, and the class where members are taught to do a job, the conference aims to organize group experience and to assist men to think through their problems and recognize basic principles. The American Petroleum Institute has prepared a brochure dealing with the subject and also a manual suitable for use under specified conditions.

Adoption of a program of supervisor training should result in a four-fold benefit:

1. To the workers it brings satisfaction with the manners and fairness of their boss and the atmosphere of their work surroundings;

2. To the supervisor it brings self-assurance and pride in his preferred position as a leader and his ability to properly discharge his many responsibilities;

3. To company management it should insure the intelligent carrying out of its policies and objectives, and the development of a productive, loyal working force through which public good will is achieved;

4. To the industry, through betterment of internal relations, it assures a wholesome improvement in acceptance by the public.

Artificial Lift Methods In the Rodessa Field

By B. J. Dowd
Union Producing Company

At present there are 944 oil wells in the Rodessa field. Of this number 435 are on artificial lift, with 112 being equipped with pumps, 2 with bottom-hole chokes, and 321 are on gas lift. Of the approximately 101,000,000 barrels of oil recovered up to January 1, 1940, from 15 to 18 percent has been produced by artificial lift. At present approximately 40 to 50 percent of the field's daily output is being obtained by artificial lifting means.

The type of equipment selected for artificial lifting of wells depends on the individual characteristics of each well, such as bottom-hole pressure, productivity index, permeability, formational gas/oil ratio, thickness of sand and percentage of water.

The most important factors considered in the selection of wells for gas-lift equipment are: (1) availability and cost of input gas; (2) estimated casing pressure required for efficient operation; (3) bottom-hole pressure of well; (4) productivity index; (5) fluid level; (6) present formation gas/oil ratio; (7) possible encroachment of water in future.

Of the 321 gas-lift wells at Rodessa, 120 are wire-line installations, 81 have differential pressure valves, 18 are pneumatic intermittent-flow chambers, 61 are on plunger lifts, 35 on straight gas lift, and 6 are using jet collars.

Several important factors must be considered in order to obtain maximum production rates with pumping units, namely: adequate pump capacity, placing the pump close to bottom, elimination of free gas from the pump, and low casinghead pressures. In the selection of pumping units, the following items should be considered: (1) a suitable pumping unit which must be adequately strong, flexible in speed, and high in efficiency; (2) below-ground equipment and methods of operation which require a minimum of servicing expense both for number of repairs and pulling costs; (3) power economy and use of prime movers suitable for the location—first cost, operation and maintenance costs considered.

The 112 units now in operation may be grouped as follows: 4 standard rigs, 92 rotary-type counterbalance, and 16 air-type counterbalance units.

Oil Development and Production Practices in the Gulf Coast

By George B. Corless and Fred N. Wise
Humble Oil & Refining Company

Proration, introduced in the Gulf Coast in the early thirties, has raised many problems. Oil producers have had a steadily declining daily income per well in spite of the necessity of continuing capital investment in new wells. Costs are being reduced by gradually eliminating unnecessary drilling, and the Gulf Coast area, once noted for its close spacing, has had many pools developed on 10-, 20- and even 40-acre spacing under proration.

Likewise, there have been many advancements in "securing the maximum ultimate recovery at the minimum of outlay."

One of the first engineering studies of drilling efficiency made after introduction of the recording weight indicator revealed that rotary rigs in the Gulf Coast, normally working two 10-hour shifts, were actually operating less than 75 percent of the time. It was obvious that four rigs working continuously could do the work of five working under the old schedule, thereby reducing investment in drill tools. Continuous operations is now an accepted practice.

Drilling time studies showed the disproportionately large amount of time spent in dismantling, moving and setting up the rig. Unitized equipment, standardized transportation plans, and improved transport equipment, have shortened this unproductive time from days to hours. This reduction saves at least $1000 a well.

Time consumed by round trips has been cut from one third to about one fifth of that spent actually drilling, due to better bit service. Average drilling speed has increased from 5 feet to 50 feet per hour, while the average service per bit has jumped from 75 to 1000 feet.

Exploration costs have been reduced materially by improved coring and logging devices, such as the wire-line retractable core barrel, electrical well logging, side-wall coring, and detectors for oil and gas in drilling mud.

Mud circulatory systems have been advanced by the use of larger pumps, and the development of full-opening tool joints, hard-faced water courses for bits and other features. Mud has been raised to the dignity of a colloidal suspension whose properties of weight, viscosity, filtration rate and frequently the pH value, are watched as carefully as the temperature and pulse of a hospital patient.

Investment in drill tools has increased in proportion to well depths, but increased rig costs have been more than offset by reduced labor and supplies expenditures. Wells 6000 feet are drilled in 12 days, while 10 years ago wells 3000 feet deep required 30 days. Overall costs for drilling and completing wells 5000 feet to 6000 feet deep are now under $4 per foot; wells 3000 feet to 4000 feet cost about $8 per foot 10 years ago.

Smaller casing and flow strings, which are practical under proration, have contributed materially to lowered well cost. Nine and five eighths-inch surface casing and 5½-inch oil string are in common use to depths of 8000 feet. Two and one half-inch and 3-inch tubing have

given way to 2-inch and even 1¼-inch is being used to a limited extent.

Less striking economies, but important in the aggregate, result from the use of smaller casingheads, reduced amounts of cement, smaller screen and liner, smaller flow lines, and fewer tanks.

Causes, Preventions and Recovery of Stuck Drill Pipe

By J. E. Warren
Carl B. King Drilling Company

The causes of stuck or frozen drill pipe are many, and often a combination of factors may be responsible. The common causes are: (1) key seating; (2) improper mud control; (3) cuttings, sand and cavings; (4) balling up.

Key seating is probably the most important single cause of stuck drill pipe, particularly in the case of deep wells. Straight holes do not key seat, and if wells are drilled nearly vertical, trouble from this source will be minimized. Since drill pipe becomes stuck by pulling up in a key seat, it is always best to work the drill pipe downward, as pulling up will stick the pipe that much tighter. If it becomes apparent that a key seat is forming, it is good practice to ream to the diameter of the drilled hole.

It is important to keep mud in proper condition. Admixtures to increase mud weight, even if ground to fine dimensions, will settle and stick pipe if the mud is deficient in gel-forming colloids.

Filtration characteristics exhibited by drilling mud have a definite relation to stuck drill pipe. Water filtrating into a formation may start a caving or sloughing condition. Also the deposition of filter cake on the walls results in the diameter of the hole.

Trouble originating from cavings, sand and cuttings can be minimized by proper mud conditioning. The design of mud pits, use of a shale shaker and addition of gel-forming colloids are effective in preventing formation of cavities.

Trouble from balling up is experienced where high rates of penetration are possible. It is thought that the cuttings are not completely hydrated into mud and large chunks may be accumulated while drilling progresses.

Methods for recovering stuck drill pipe fall into two classifications. The first includes those methods used to free drill pipe while keeping the drill stem intact, such as use of oil, gas slugging, circulating clear water and mechanical methods like spudding and bumping the pipe. The second classification includes those methods used in case the drill pipe cannot be freed while intact as one unit, including backing off, use of inside cutters, shooting off pipe, washing over, jars, etc.

Limitations of Electric Logging

By Joseph Zaba
Engineer, Rio Bravo Oil Company

The method of electrical logging is comparatively new, and many of its users have not had an opportunity to make a sufficiently thorough study of the technique of interpretation of an electrical log. As a result there exists now in many instances a tendency to expect from the method a simple and definite answer to many complex and difficult questions. Such a tendency must lead inevitably to costly mistakes and is unfair to the method, since mistakes will nearly always be charged, not against the wrong interpretation but against the method itself.

The profile of an electrical log may be affected by several factors which usually have no direct relation to these formational characteristics in which we are primarily interested when surveying a prospective oil well. Therefore, the analysis of an electrical log requires considerable thought and study if serious errors of interpretation are to be avoided.

The concentration of salts in formational waters is usually higher than in the drilling mud. The electric current, therefore, enters the formation, and the self-potential diagram shows the familiar negative anomaly with respect to the shale base line. However, whenever the mud is saltier than the formational water, due either to the penetration of a salt mass or to the flow of salt water from sands under abnormally high pressures or other reasons, the self-potential diagram may show a positive anomaly instead. These variations may be taken into consideration in correlating work.

Another effect of saline mud on the self-potential diagram is a complete masking of details of the profile.

The standard resistivity also may be affected because filtration of the brine mud into the formation will reduce the resistivity of the portion of the formation immediately surrounding the hole bore. The effect will be noticed particularly on curves with small radius of lateral investigation.

The weight of the mud will affect the amplitude of the anomalies of the self-potential curve. Field experiments have shown that increasing the weight of mud will increase the peaks of the curves and in certain cases also will have a tendency to shift the base line of shales. Some chemicals used for controlling the viscosity may have the same effect on the self-potential and resistivity curve as the increased salinity of the mud.

Formational pressures abnormally high for the given depth may obliterate through reversal of filtration, the normal effect of a porous formation on the self-potential curve.

The presence of connate water in those oil-bearing strata, which are potential sources of clean oil, has a very decided effect on the resistivity of an electrical log.

Proper interpretation of electric logs will eliminate many difficulties now charged to the instruments themselves.

A Comparison Between Electrical Well Logging and Core Analysis

By P. B. Leavenworth
Gulf Oil Corporation

Many services are available to oil operators, who at times may have difficulty in choosing between two of possibly similar character, both of which have points of merit; two such services are electrical well logging and core analysis, each of which furnishes some data not indicated by the other.

The graphic method of presenting electrical log records is a distinct advantage to the geologist in correlation work, as well as in his ever-present problem of convincing the executive of the validity of his arguments regarding the selection of locations and manner of completions. Within local areas, and particularly on structure, electrical diagrams may be correlated successfully, often in great detail. Valuable conclusions as to sand conditions and other pertinent data may be drawn also. In many fields wide variations in permeability exist within the producing section, and correlation is often possible by core analysis when other methods fail. Other core analysis data are often valuable in this connection. For the determination of structure the electrical log is recommended. For details of the producing section both electric log and core analysis.

Both methods are of value in well-completion studies, as great detail is often necessary to successful completion, particularly in thin-sand fields and where gas and water problems are important. Both procedures likewise are of value in estimating oil and gas contents, as the same problems exist as in well completions.

Since core analysis may indicate the rate of efficient withdrawals and electrical logs the structure and thickness of pay members, both services are valuable in well-spacing calculations.

Gun Perforation and Acidization in Open Limestone Formations

By J. A. Jones
Lane-Wells Company

Acid treatment following gun perforation has given excellent results in increasing potentials and rates of recovery on a high percentage of wells to which the technique has been applied. This new method of well completion has been used in the limestone formation fields of the Permian Basin of West Texas.

Where a lime pay has a good saturated porosity and a high vertical permeability, a considerable increase in production can be obtained by increasing the horizontal permeability through perforation. This action connects the interstices and allows the oil more freedom of flow. Through channels thus opened, acid will be able to reach a much greater area of the pay zone, and the friction in flow of oil to the bore hole will be decreased materially.

In tight lime formations where there is low permeability in both directions, perforation will increase the permeability; but, of course, such good results cannot be obtained as with high vertical permeability locations. However, should the tight formation extend only a short distance from the bore hole, perforations may go through to a formation of good porosity beyond.

Seek 10-acre spacing for Anzac-Morris, Coleman County

Operators in the Anzac-Morris field, Coleman County, requested 10-acre spacing at a Texas Railroad Commission hearing last week. Three wells are producing in the field.

At the same hearing, Anzac Oil Corporation asked for 16-acre spacing for the Morris "F" lease, 1½ miles from the Anzac-Morris field. The company asked for 50 barrels per well a day. An allowable of 20 barrels is now granted.

Coleman Refining Corporation representatives said the company needed an additional 5000 barrels per month and would take additional production.

Ickes Tells Kilgore Audience Federal Oil Control Necessary

SECRETARY of the Interior Harold L. Ickes carried his fight for federal control of the oil industry into the East Texas field last week, declaring state oil and gas conservation laws were "not enough." Ickes spoke at a Kilgore Chamber of Commerce banquet commemorating the tenth anniversary of the field's discovery.

"We must have federal law to coordinate the oil and gas conservation activities of the states," Ickes said, explaining his position on the Cole bill now pending in Congress. "It would be a mistake to set aside the state conservation laws. What is needed is a co-ordination of these laws with a view to the welfare of the whole nation."

The Secretary of the Interior, whose department would administer the Cole bill if approved by Congress, hit at Illinois and California for failure to pass conservation laws, officials of oil states who have taken stands against the Cole bill, and groups within the industry fighting federal control.

"The individual states cannot be expected to shoulder the burden of solving the problem of conservation of oil and gas for the nation as a whole," Ickes said.

"The present federal laws are inadequate. The Cole bill is an important step in the direction of setting up standards of production to prevent waste."

"Patriotic Campaign"

"To fight this essentially patriotic bill (yes, I consider it patriotic to defend the resources of our country) its opponents have dragged out an old and smelly red herring. The Governor of Oklahoma, for instance, told the American Petroleum Institute that the Cole bill was 'another step in the direction of collectivism' and that 'collectivism' is 'the bone and sinew of Communism.' I hope that the learned governor held his nose while flailing oily collectivism with his putrid red herring.

"When I appeared before the Cole committee in support of the bill, several statements were read to me to the effect that the measure was as red as Russia. I replied that if there were any concealed Communistic language in it, to strike it out. I went on to say that if the committee and Congress could find any better way of conserving oil and gas than is proposed in the Cole bill, I would be happy to give it my support. I am still ready to support any means that will effectively conserve oil and gas, whether introduced by Congressman Cole of Maryland or by any son of Texas—be he your beloved and influential Senator, Morris Sheppard, or the author of the hot oil act, Tom Connally, or your own competent freshman congressman, Lindley Beckworth.

"Those in the oil industry who oppose the bill did so because they want to run their own business in their own way, regardless of the effect upon the public interest," Ickes charged. "Certain elements in the oil industry know that an effective way to hamper the cause of oil conservation is to spread the malicious propaganda that the state and federal forces are enemies of the oil business and want to grab power for themselves. This is willful misrepresentation.

"There are people who persist in charging that, if the Cole bill should pass, it would mean that federal officials and agencies would supersede local ones in regulating the production and supply of petroleum. This is not the intention, and if there is any language in the Cole bill that is doubtful in this regard, I am willing to have it clarified. The purpose underlying the Cole bill is that of co-operation, just as we have co-operated with the states under the Connally act."

Surprised at Industry Opposition

The Secretary expressed "surprise" that members of the industry should oppose the federal control measure, declaring that state officials are sometimes "over-anxious about some improbable encroachment upon their prerogatives" but that "oil industrialists are supposed to be a hardheaded group of businessmen."

"Most of them already are willing to go so far as to uphold the principle of prevention of waste in oil production," Ickes said. "I venture to say that every oil industrialist is in favor of this unless he is taking oil out of a pool regardless of what proportion of it may justly be regarded as his own. So the straight-shooting oil producer favors an oil conservation law that is enacted by the state. But what is he going to do when a state neglects or refuses to enact such a law to the injury of his industry as a whole?

"If he has any regard for his own interests, he will support some such bill as that introduced by Congressman Cole. Just as the oil industry is wider than any state, so is the question of the conservation of oil more than a state interest, especially if states refuse to check the reckless exploiter. I understand that, with its dividend checks, recently The Texas Company, which is one of the biggest in the whole country, enclosed a slip to its stockholders in favor of the enactment by Illinois of a conservation law. This indicates that this company is at least beginning to see the light. This was statesmanlike of The Texas Company but not as far-seeing as one would expect.

"It is like a man seeing well through one eye but stubbornly refusing to use both to the fullest possible extent. This same company, in its last annual report, also stated its opinion that no federal law of the type of the Cole bill should be enacted. Some companies have been charged with wanting proration and conservation in places where they are at a disadvantage or where they need protection from unscrupulous persons. Few, if any companies, have been charged with wanting the uniformity in state conservation laws that would result from the enactment of federal legislation.

Prefer State Acts

"We would prefer states like California and Illinois to adopt oil conservation acts of their own. But if they refuse to do so, because of local pressure from selfish groups, then under the Cole bill federal officials would be able to step in and insist on procedures in the interest of the whole people. And if a state, having a conservation law, should nevertheless permit wasteful practices, then again federal officials could do what the state neglects to do. But in no instance would federal officials have any right or power to interfere if the states themselves properly supervised the production of their own oil resources.

"May I suggest that the small producer needs such co-operation more than the large one. The great integrated companies are fully able to take care of themselves. They need no help, either from the states or the federal government. In some instances they have come to regard themselves as superior, not only to the states but to the nation itself. And this is not only true of great oil concerns but of lumber and sulphur as well as many others that I could mention. The worst aspect of many of these big businesses is that they have no interest in or concern for the social and economic welfare of the state in which they may happen to operate because they are absentee-owned; controlled by great financial interests in New York and other centers of the North."

Ickes declared Texas was fortunate in having a conservation act.

"Illinois," he said, "has no oil conservation law and is permitting one of its most precious resources to be wasted. I regret to have to say that my home State has hogged the market by reason of its geographical position. Illinois' excessive production has seriously affected the oil producers of the Mid-Continent. In other words, Illinois has not only been profligate, but also anti-social in adding burdens to other oil communities that are seeking orderly development."

MEN IN THE INDUSTRY'S NEWS

FRED SHAYES, with Union Producing Company at Beeville, Texas, was elected president of the South Texas Geological Society at a recent meeting of the group in San Antonio. Gentray Kidd, Stanolind Oil & Gas Company, San Antonio, was named vice president, and Bob Kolm, Atlantic Refining Company, San Antonio, was elected secretary-treasurer. New committees will be named when new officers take office.

L. B. HERRING, geologist, Corpus Christi, presented a paper on "Development in Southwest Texas in 1939" recently before the South Texas Geological Society. He will give the same paper at the meeting of the American Association of Petroleum Geologists in Chicago, April 10-13.

DR. R. A. SMITH, Michigan state geologist, and Dr. R. B. Newcombe, Grand Rapids consulting geologist, presented papers before the geology and mineralogy section of the Michigan Academy of Science during its forty-fifth annual meeting at Ann Arbor last week. J. B. Maebius, Gulf Refining Company, Saginaw, was chairman of the section meeting.

WILLARD G. RICH, head of a group of independents who discovered the Rich pool in southwestern Stephens County, Texas, in 1938, has organized Richtex Oil Corporation to take over the discovery block and proceed with development. Rich is president of the concern, and resides in New York City. J. T. Harris, Jr., Fort Worth attorney, is chief counsel and state agent.

HERBERT HOOVER, JR., president of United Geophysical Company, will address the Spring meeting of the American Institute of Mining and Metallurgical Engineers, Southern California section, April 3 at Los Angeles. H. G. Moulton, A. I. M. E. national president, and Daniel C. Jackling, past president, will attend.

J. A. GERHARD, former auditor in the oil and gas division of the Texas Railroad Commission, has been transferred from Austin to Kilgore to take charge of records and tender departments applying to the East Texas field. He succeeds W. L. Cain, who resigned after being with the enforcement body for 4 years.

K. A. MYGDAL, Wichita Falls district geologist for The Pure Oil Company, discussed deep oil exploration in the North Texas district at the regular luncheon meeting of the Fort Worth Geological Society on March 25. He predicted that the oil yield from the deep horizons, currently representing one-third of the daily output, will soon be greater than the flow from the shallow pools and fields.

J. EDGAR PEW, Sun Oil Company, Philadelphia, is chairman of the American Petroleum Institute's committee on petroleum reserves which last week reported discoveries of underground reserves to have almost doubled production during 1939. Members of the committee are R. F. Baker, The Texas Company, New York; L. T. Barrow, Humble Oil & Refining Company, Houston; Frank R. Clark, The Ohio Oil Company, Tulsa; G. Clark Gester, Standard Oil Company of California, San Francisco; F. H. Lahee, Sun Oil Company, Dallas; J. M. Sands, Phillips Petroleum Company, Bartlesville; Fred Van Covern, American Petroleum Institute, New York; Theron Wasson, The Pure Oil Company, Chicago, and Fred E. Wood, Standard Oil Company (Indiana), Chicago.

BURDETTE BLUE, president of Indian Territory Illuminating Oil Company, Bartlesville, has been re-named chairman of the public relations committee of the Independent Petroleum Association of America. Members are Frank M. Porter, Wirt Franklin Petroleum Corporation, Oklahoma City, vice chairman; R. A. Broomfield, Jr., Barnsdall Oil Company, Los Angeles; C. A. Johnson, Holly Oil Company, Los Angeles; T. C. Johnson, Wichita; Harry Leonard, Roswell, New Mexico; R. J. Daugherty, Bartlesville; R. C. Jopling, Phillips Petroleum Company, Bartlesville; Frank Long, Oklahoma Natural Gas Company, Tulsa; J. S. Noland, Barnsdall Oil Company, Tulsa; Jake L. Hamon, Cox & Hamon, Dallas; John W. Naylor, Fort Worth Star-Telegram, Fort Worth, and Chas. A. Warner, Houston Oil Company of Texas, Houston.

DON O. CHAPELL, geologist with Transwestern Oil Company in Illinois and Michigan for the past two years, has been transferred to the company's main office at San Antonio, Texas.

R. L. ROBERTS, geologist, and Dewey G. Gibson, landman, Transwestern Oil Company, have been transferred from Kalamazoo, Michigan, to 204 Murray Building, Grand Rapids, Michigan.

LLOYD PAXTON, formerly with the Carter Oil Company at Tulsa, has been transferred to Egypt where he is employed in the accounting department of Standard Oil Company of Egypt.

IRA H. CRAM, chief geologist for The Pure Oil Company at Tulsa, spoke before a regular meeting of the Tulsa Geological Society on March 18 on "Regional Structure of the Mid-Continent Area."

WALTER E. SHORT, Seguin, Texas. has formed the National Radio Petroleum Survey, Inc., to experiment with a radio-type geophysical unit. Short, the inventor, claims a beam can be directed to determine possible location of crude deposits. Associated with him are Pat M. Armstrong, Senior and Junior.

TOM R. BANKS, formerly chief geologist for Transwestern Oil Company, has opened offices at 1732 Milam Building, San Antonio, as consultant.

T. N. ROBERTS, production department of Shell Oil Company, has been transferred from Tulsa to Greenwich, Kansas.

AL BUCHANAN, drilling contractor of San Antonio and one of the pioneer operators in South Texas, will be the guest of honor at the third annual Oil Men's Jubilee of the South Texas Chamber of Commerce to be held in San Antonio Friday, April 19.

F. M. Frasher is chairman, and E. H. Keator, vice-chairman of the committee on arrangements. Both are San Antonians. Members of the committee are Merschel H. Cooper, Lamar Seeligson, Rodney DeLange, Joseph S. Morris, G. G. Mortimer, all of San Antonio; W. M. Griffith, Sinton; George A. Hill, Jr., Houston; L. W. Dirks, Tuleta; Tom Graham and Herman Heep, Corpus Christi; John J. O'Hern and O. W. Killam, Laredo.

A jubilee golf committee is headed by Rodney DeLange, San Antonio, with John J. O'Hern, Laredo, as vice-chairman. Members are C. E. Yoakum, J. W. Gorman, W. Earl Rowe, Lamar Seeligson, R. S. Bristol, George Coates and K. D. Harrison, all of San Antonio, and George D. Wilson of Houston.

ED W. OWENS, San Antonio, secretary-treasurer of the American Association of Petroleum Geologists, reviewed current activities of the organization before the Houston Geological Society March 28. He reported a membership of 3240 as of March 1, 67 percent regular members and the remainder associates. This organization experienced an improvement in net earnings and an increase in total assets for 1939. Henry A. Ley, A. A. P. G. president, was a visitor at the Houston society meeting.

J. P. MARTIN, drilling contractor, has completed the first of a four-well drilling program for the Mexican Government. The tests are just across the border, near Nuevo Laredo, Tamps. Production is from about 650 feet, and the wells supply the border town with gas.

E. D. JUMAN, Dallas, chief geologist for Atlantic Refining Company, was on a pleasure trip, which included a fishing trip with the entire force of the company's Corpus Christi land and geological office.

DAVID FELDMAN, of Corpus Christi, has been spending much of his time in Mississippi in connection with the preparing for a test on a 5000-acre block in Yazoo County. The well will be drilled with a rig moved from Corpus Christi.

CHARLES NELSON, with the Seaboard Oil Corporation of Delaware, was back in Corpus Christi after a period in Illinois to supervise drilling of a wildcat.

WALTER B. PYRON, executive vice president of Gulf Oil Corporation, Houston, headed a group of company officials who assembled in Fort Worth March 23 for presentation of service pins at a banquet given 229 employes with 10 years service or more. H. L. Stone, general counsel, and William A. Slater, vice president in charge of refineries,

both of Pittsburgh, and E. C. Kincaid, vice president in charge of pipe lines, Houston, also made brief talks. F. J. Adams, Fort Worth division general agent, who qualified for a 25-year service award, was toastmaster.

FREDERICK F. MELLEN, who while working for the Mississippi Geological Survey discovered the Tinsley Dome structure, Yazoo County, Mississippi, present location of the state's only oil field, has resigned his post with the survey and opened offices as consulting geologist at West Point, Mississippi.

W. S. "BUCK" MORRIS, field chairman for the East Texas Engineering Association, Kilgore, Texas, was a Houston business visitor last week. He remained to attend the Southwestern District meeting of the American Petroleum Institute.

GEO. M. VANDAVEER, JR., former assistant general superintendent of the southern division, Phillips Petroleum Company, Houston, has been named chief petroleum engineer for Midstates Oil Corporation with offices at Tulsa.

DR. GARRETT KEMP, Dallas geophysicist, will be the principal lecturer at a short course and conference on practical geophysics to be held at A. & M. College of Texas April 4 to 6.

LAWRENCE HEWITT, district geologist for Midstates Oil Corporation at New Orleans, and W. C. Weaver, district geologist at Corpus Christi, visited in Houston last week.

C. L. MAGUIRE, president of the Roosevelt Oil Company, Mt. Pleasant, Michigan, and Mrs. Maguire, returned to their home last week following a 6-weeks' vacation in Hawaii.

R. S. BRENNAND, West Texas district land man for Standard Oil Company of Texas, returned to Midland headquarters last week after completing special assignment work in Mississippi.

JACK BURDEN, McAllen, Texas, has signed a contract with Atlantic Refining Company for drilling several deep wells in Cuba. His rig has been ordered shipped from Houston. Burden will go to Miami from McAllen and fly to Cuba.

WILLIAM HOGAN, superintendent of operations for Argo Oil Corporation in Wyoming's Lance Creek field, and Mrs. Hogan are vacationing in Mexico.

W. T. SHELTON, R. H. Shelton and T. O. Dandridge, all of Ada, Oklahoma, have organized W. T. Shelton Drilling Company as an Oklahoma corporation.

CONRAD BILGERY discussed "Some Contributions to the History of the Pleistocene of the Denver Basin" before the Rocky Mountain Association of Petroleum Geologists at Denver, March 18.

CHARLIE JACOBSON, district superintendent for Barnsdall Oil Company, at Victoria, Texas, took a prominent part in arranging a dinner March 21 which was attended by more than 750 oil men. He is chairman of the oil and gas committee of the Victoria Chamber of Commerce. George A. Hill, Jr., president of Houston Oil Company of Texas, was one of the speakers.

HOLIDAY HAYLEY, secretary-treasurer of Arcadia Refining Company, Tyler, Texas, is in Centralia, Illinois, on a business mission. He has been looking over properties in Illinois and Indiana and is due to make a stopover at St. Louis, before returning to Texas.

G. S. YOUNG, chief geologist for the Canadian Department of Mines, Ottawa, told the Canadian Institute of Mining & Metallurgy at Winnipeg last week that large areas of Canada still await geological exploratory work.

DR. F. A. MELTON, University of Oklahoma, spoke before the Shawnee Geological Society March 25 on "Shore Features as Revealed by Aerial Photographs."

ANDREW F. SCHOEPPEL last week was re-named chairman of the Kansas Corporation Commission for a four-year term.

DIED:

F. D. CLARK, Detroit operator who was active in the Bloomingdale-Allegan plays, died in a Detroit hospital March 16 from pneumonia. It is believed he contracted pneumonia while overseeing drilling-in of a well three weeks ago in Monroe County. The body was taken to Sydney, Ohio, for burial.

LEROY ROBINSON, 74, a pioneer drilling contractor in the Mid-Continent area, died March 22 at his home in Independence, Kansas.

JOHN P. FLYNN, 69, president of Reno Oil Company, Sisterville, West Virginia, and Wichita Falls, Texas, died March 23 at his winter home in Florida.

E. A. FELMLEE, 59, driller, died March 26 while visiting a lease near Wilburton, Oklahoma. He had been drilling in Oklahoma for the past 20 years, coming to the state from Oil City, Pennsylvania.

BUCK SAMS, 28, Seagraves, Texas rotary rig workman, was killed March 25 in an automobile collision near Weatherford, Texas. His wife, a passenger in the car, escaped with minor injuries.

Twenhofel to discuss sedimentation at Texas A. & M.

Dr. W. H. Twenhofel, professor of geology at the University of Wisconsin, will discuss problems in sedimentation at a conference for Texas geologists to be held Saturday, April 20, at A. & M. College of Texas. The conference will conclude a series of lectures Dr. Twenhofel will give at the college April 15 to 20.

Two plans for the April 20 session are being considered. One calls for convening at 10:30 a.m. at the college with the conference extending through the day, and the other for a field trip to start from Houston at approximately 6:20 a.m. with the conference to follow an evening dinner at the college. Outcrops in the Wilcox and other areas would be studied on the trip.

A.S.M.E. plans two meetings in April at Norman, Oklahoma

The Petroleum Division of the American Society of Mechanical Engineers, cooperating with the College of Engineering, University of Oklahoma, will sponsor a two-day Petroleum Fluid Metering Conference at Norman April 11 and 12.

The metering conference will be followed by a meeting April 12 and 13 at which additional papers on petroleum subjects will be presented.

Fluid Metering Conference

Papers to be presented at the fluid metering conference follow:

"Viscosity and Its Effect on the Accuracy of Positive Displacement Metering," J. W. Donnell, University of Oklahoma.

"Fundamental Principles of Volume Meters," E. E. Ambrosius, University of Oklahoma.

"Some Fundamental Considerations in the Design and Application of Displacement Meters," E. W. Jacobson, Gulf Research and Development Company.

"Crude Production Measurement," E. O. Bennett, Continental Oil Company.

"Calibration of Meters in Pipe Line Service," Henry Pohl and E. H. Counts, Sinclair Prairie Pipe Line Company.

"The Use of Meters in Gasoline Pipe Line Service," roundtable discussion led by S. S. Smith, Shell Oil Company.

"Report on Fluid Metering Research at the University of Oklahoma," E. E. Ambrosius, University of Oklahoma and H. S. Bean, United States Bureau of Standards Washington, D. C.

"The Elimination of Air from Petroleum Pipe Lines," roundtable discussion by H. G. Smith.

"Problems Encountered in Distillate Measurement," Earl Kightlinger, Arkansas-Louisiana Gas Company.

"Progress in the Use of Meters in Crude Pipe Line Service," T. R. Aude, Stanolind Pipe Line Company.

A.S.M.E. Conference

Papers to be presented at the A.S.M.E. conference are:

"Distribution of Heat Energy, its Measurement and Control," E. G. Bailey, Babcock & Wilcox Company.

"Displacement Meters in the Refinery," W. H. McCoy, Gulf Oil Corporation.

"Thermodynamic Data on Hydrocarbons and Their Application," Keith Lindley, Gulf Oil Corporation.

"Southern Industry and the Future," E. W. O'Brien, Southern Power & Industry.

"Measurement of Individual Well Production," W. O. Kitsman, Phillips Petroleum Company.

"The Application and Use of Reda and Kobe Pumps in the Oklahoma City field," N. B. Chenault, Jr., British-American Oil Producing Company.

"Maintenance of Gravity for Oil in Lease Storage," Max R. Wise, Bethlehem International Supply Company.

"The Analytical Determination of Stresses in Cylindrical Pressure Vessels Due to Saddle Supports," D. M. Green, Black, Sivalls & Bryson, Inc.

"The Economical Selection of Compressor Equipment for Gas-Lift Operation," E. O. Bennett, Continental Oil Company, and G. M. Stearns, University of Oklahoma.

"Operating Experiment With the 850 psi-900°F Extension at Market St. Generating Station," K. P. Kammer, New Orleans Public Service.

"Construction of the Utah Pipe Line," W. G. Heltzel, Stanolind Pipe Line Company.

"Visual Studies of Flow of Air-Water Mixtures in Vertical Pipe," R. L. Huntington, University of Oklahoma.

"Performance and Design of Shell-and-Tube Heat Exchangers," Bryon Short, University of Texas.

"Requirements of Equipment in Gas-Lift Operations," S. F. Shaw.

Motion Pictures Showing Pipe Line Construction on Utah Pipe Line, W. G. Heltzel.

"Compression Ignition Oil Engines in the Oil Industry," V. L. Meleev, Oklahoma A. & M. College.

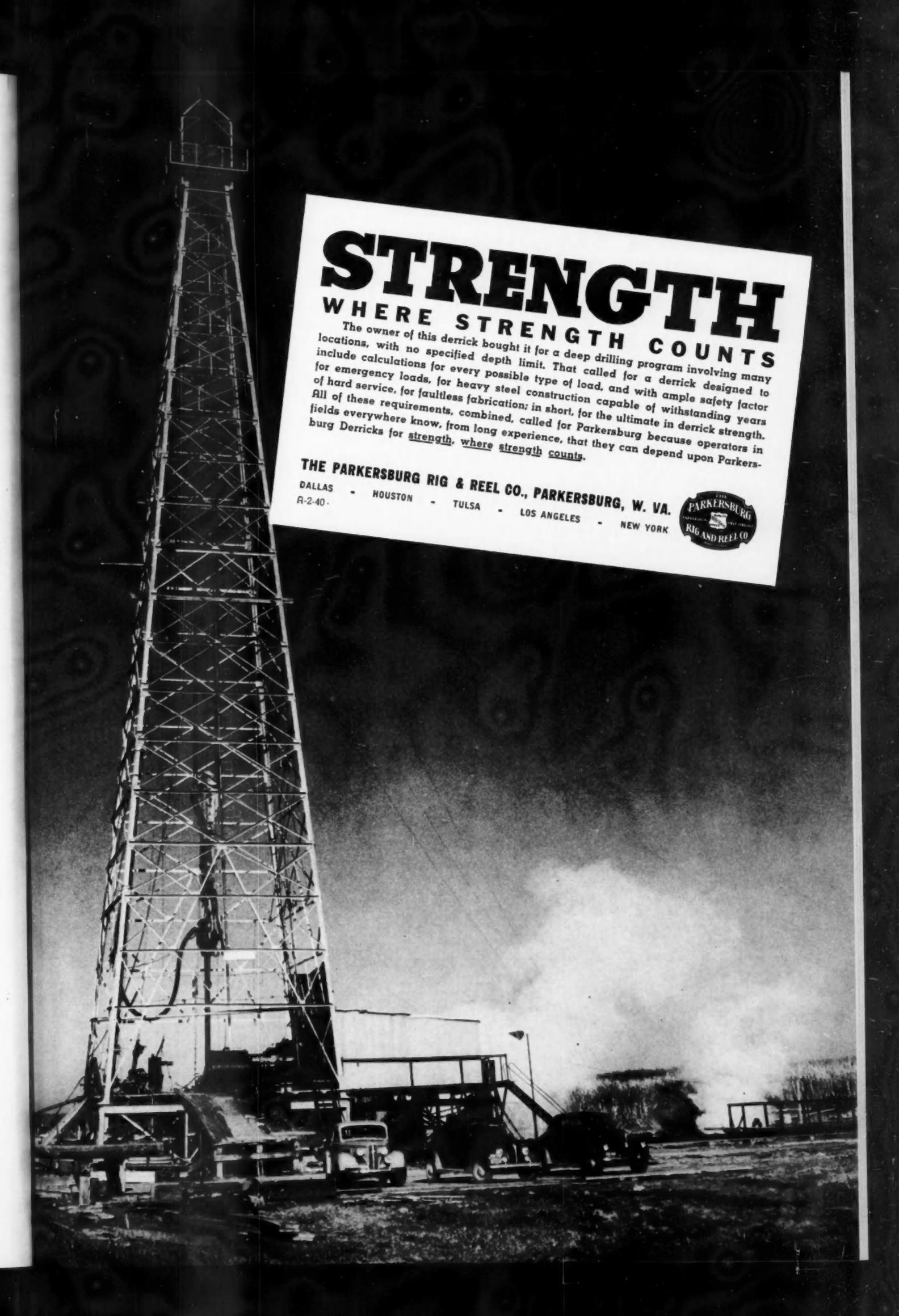
"Development of Pipe Line Charts By Dimensional Analysis," L. H. Cherry, University of Oklahoma.

"Weighing of Wells and Interpretation of Cards," F. C. Jones, Phillips Petroleum Company.

"Hydraulic Drives in Industrial Service," J. B. Jenkins, Twin Disc Clutch Company.

"The Application of Fluid Level Measurement," Charles Rodd, Gulf Oil Corporation.

"Problems Encountered in the Maintenance of the Combustion System of Air Injection Diesel Engine," E. R. Spencer, Texas Empire Pipe Line Company.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The owner of this derrick bought it for a deep drilling program involving many locations, with no specified depth limit. That called for a derrick designed to include calculations for every possible type of load, and with ample safety factor for emergency loads, for heavy steel construction capable of withstanding years of hard service, for faultless fabrication; in short, for the ultimate in derrick strength. All of these requirements, combined, called for Parkersburg because operators in fields everywhere know, from long experience, that they can depend upon Parkersburg Derricks for strength, where strength counts.
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A. P. I. Reports Added Reserves Almost Double Production in 1939

NEW, proved petroleum reserves totalling 2,399,122,000 barrels, nearly double the amount of oil produced in 1939, were discovered or developed in new and old fields of the United States during last year, according to a report of the American Petroleum Institute's Committee on Petroleum Reserves.

The net increase of 1,134,866,000 barrels in known underground stocks of petroleum, after deduction of the 1,264,256,000 barrels of oil produced in 1939, raised the January 1, 1940, proved-reserve inventory to a new record total of 18,483,012,000 barrels. This total, the committee emphasized, represents only a conservative estimate by the many geologists and petroleum engineers of reserves already proved by drilling and recoverable by present production methods. No estimates are included for oil which still is to be found in areas known to be favorable to accumulation of oil, but as yet untested.

New pools and new producing horizons discovered in 14 states last year gave the nation a minimum of 340,667,000 barrels of new reserves, the committee stated, adding that "pools tested by only one or two wells have been assigned relatively low reserves which may be considerably augmented by later development.

"The ultimate magnitude of the reserves in the new pool will not be known until their respective productive limits are completely outlined," the report said. "This may not occur for a period of years. As development continues and as new reserves are discovered, they will appear as upward revisions of these earlier estimates."

Development and extension of fields discovered prior to January 1, 1939, accounted for most of the year's new reserves. Upward revisions of previous estimates of reserves in these fields added 2,058,455,000 barrels to proved United States oil reserves in 1939.

The greatest increase in reserves, according to the report, was in Texas, which added 805,134,000 barrels of new underground oil inventory. Texas also leads all other states in total reserves, its already proved petroleum resources amounting to more than one-half of the United States total. California, with 567,933,000 barrels of new reserves discovered or developed in 1939, was second.

Third largest gain was recorded in Illinois, where developments in 1939 added 233,091,000 barrels to the previous total. Proved reserves for the state on January 1, 1940, were estimated by the committee at 381,636,000 barrels. Two years ago, on January 1, 1938, total reserves then known amounted only to 40,884,000 barrels. New reserves of more than 100,000,000 barrels also were developed in each of three other states last year: Arkansas, Kansas and Louisiana.

Two states, Mississippi and Nebraska, in which commercial quantities of oil were discovered late in 1939, entered the reserve estimate for the first time. Proved reserves in the new pools in these states, still incompletely developed, conservatively were estimated by the committee at 6,800,000 barrels.

Every effort was made to secure fair, unprejudiced and representative estimates, the report added, and each member of the committee appointed in his district a number of subcommittees of experienced geologists and petroleum engineers to gather and study the necessary data. Factors pertaining to the various oil pools were examined and adjusted in the light of new information, and the figures include all grades of crude oil and distillate but only that which is known to be recoverable under existing economic and operating conditions.

In the first column of the accompanying table are estimates of proved reserves arrived at by the committee as of January 1, 1939. The second column lists changes which oil-field development during 1939 indicated as necessary in the estimates in the first column. These revisions resulted from extensions of known pools and from new data pertaining to reservoir conditions such as thickness and permeability of the pay zone, percentage recovery, etc.

The third column shows the proved reserves in new pools discovered in 1939, and the proved reserves discovered in that year in new producing horizons in the older, known pools. The fourth column is the total of the second and third columns and represents the proved reserves discovered and developed in 1939.

Production of the year 1939 in the fifth column is deducted from the sum of the first and fourth columns to arrive at the estimated proved reserves as of January 1, 1940, shown in the sixth column.

Estimated Proved Petroleum Reserves in the United States

(Barrels of 42 Gallons)

STATE	Proved Reserves As of January 1, 1939 (1)	Revisions in Proved Reserves (Including Extensions) In Fields Known on January 1, 1939 (2)	Estimated Proved Reserves in New Pools and New Producing Horizons Discovered in 1939 (3)	Proved Reserves Discovered and Developed in 1939 (Col. 2 + 3) (4)	*Production During 1939 (5)	Proved Reserves As of January 1, 1940 (Col. 1 + 4 Less 5) (6)
Arkansas	118,246,000	144,270,000	8,775,000	153,045,000	21,143,000	320,148,000
California	3,188,763,000	521,433,000	46,500,000	567,933,000	224,354,000	3,532,342,000
Colorado	17,713,000	3,840,000	.....	3,840,000	1,391,000	20,162,000
Illinois	242,847,000	189,393,000	43,698,000	233,091,000	94,302,000	381,636,000
Indiana	6,031,000	99,000	9,477,000	9,576,000	1,443,000	14,164,000
Kansas	613,230,000	149,549,000	23,411,000	172,960,000	60,723,000	725,467,000
Kentucky	37,545,000	10,622,000	1,500,000	12,122,000	5,581,000	44,086,000
Louisiana	1,040,256,000	139,532,000	87,306,000	226,838,000	93,869,000	1,173,225,000
Michigan	42,749,000	30,515,000	613,000	31,128,000	22,799,000	51,078,000
Montana	104,471,000	—5,050,000	.....	—5,050,000	5,961,000	93,460,000
New Mexico	703,252,000	266,000	20,973,000	21,239,000	37,323,000	687,168,000
New York	40,490,000	.....	.....	.....	5,098,000	35,392,000
Ohio	26,358,000	7,470,000	1,020,000	8,490,000	3,156,000	31,692,000
Oklahoma	1,162,370,000	43,324,000	17,530,000	60,854,000	160,072,000	1,063,152,000
Pennsylvania	200,460,000	.....	.....	.....	17,337,000	183,123,000
Texas	9,447,764,000	732,070,000	73,064,000	805,134,000	484,527,000	9,768,371,000
West Virginia	24,468,000	25,000,000	.....	25,000,000	3,580,000	45,888,000
Wyoming	261,133,000	65,900,000	.....	65,900,000	21,417,000	305,616,000
Miscellaneous†	.....	222,000	6,800,000	7,022,000	180,000	6,842,000
Total United States	17,348,146,000	2,058,455,000	340,667,000	2,399,122,000	1,264,256,000	18,483,012,000

* U. S. Bureau of Mines figures. † Includes Mississippi, Nebraska, Tennessee, Missouri and Utah.

Markets steady despite disturbing situations

The industry's markets have continued generally steady in the face of some disturbing circumstances, including the record-breaking gasoline stocks and production of crude oil in excess of current market demand.

Continuing to circulate are reports of under-market selling of crude, not only in Illinois but also in some of the Mid-Continent states. Estimates of quantities involved have ranged from 100,000 barrels a day upward, with Illinois ascribed around 75,000 barrels.

Although Texas conservation authorities earlier had indicated that they would set allowables approximately within the Bureau of Mines estimate of market demand, they last week promulgated an order for April that authorized production 182,000 barrels a day in excess of the indicated demand. Therefore, Texas crude likely will accumulate in storage in large quantities in April as in March, with a depressing effect on the market.

Other prorated states of the Mid-Continent, apparently encouraged to do so by the Texas example, likewise have adopted April allowables above the Bureau of Mines estimates of market demand.

For the country as a whole, therefore, the current and prospective crude production situation is definitely unsatisfactory.

Gasoline Market

The exceptionally large gasoline stocks also embody adverse implications, being now about 20,000,000 barrels in excess of estimated necessary operating requirements, following another increase of nearly 700,000 barrels in the week ended March 23, to 101,298,000 barrels.

However, gasoline prices have remained unchanged in the Mid-Continent refining districts and in most of the marketing areas.

The prices at refineries are very little, if any, above costs of manufacture, and apparently, plant owners are declining to lower quotations to levels at which they would suffer losses.

This maintenance of the market may be more difficult, however, as the consuming season advances, inasmuch as refiners would hesitate to enter the fall-winter season with surplus stocks.

Other Products

The markets for products other than gasoline remain comparatively firm. Kerosene is particularly strong, with supplies relatively light and confidently held.

Continued cold weather has maintained good demand for heating oils, and some refiners have not been able to meet demand with their current production, with the result that withdrawals from storage have continued in substantial quantities.

Demand for heavy fuel oil has shown some additional improvement, after having lagged a little in recent weeks, and there has been some betterment of prices.

Several sellers last week advanced their quotations on Diesel oil 10 cents a barrel in New York harbor and at other ports on the Atlantic Coast.

The markets for lubricants have continued about unchanged, having settled down after easing off somewhat from the high levels reached around the beginning of the year.

Trends of United States Production and Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	FUEL OIL STOCKS	
					Gas Oil & Dist. Fuels	Residual Fuel Oil
1937:						
August 28	[5]3,731,450	3,425,000	309,506,000	66,997,000	112,111,000	
September 25	3,666,300	[5]3,455,000	307,974,000	65,620,000	116,472,000	
1938:						
March 19	3,433,550	3,080,000	306,380,000	[5]93,192,000	122,067,000	
November 12	3,243,250	3,180,000	273,394,000	[6]67,551,000	34,175,000	120,491,000
December 10	3,245,100	3,150,000	[6]269,509,000	68,687,000	32,068,000	118,711,000
December 31	3,201,450	3,115,000	273,024,000	71,695,000	29,082,000	115,741,000
1939:						
January 28	3,248,250	3,235,000	271,763,000	77,279,000	26,583,000	112,766,000
February 25	3,328,850	3,185,000	271,758,000	84,597,000	23,419,000	110,252,000
March 25	3,382,350	3,225,000	273,915,000	87,561,000	21,487,000	107,551,000
April 22	3,526,700	3,280,000	277,156,000	[2]87,769,000	21,085,000	105,035,000
April 29	3,568,200	3,405,000	278,440,000	86,794,000	[7]25,844,000	[7]108,409,000
May 6	3,580,900	3,275,000	[2]278,607,000	86,216,000	26,167,000	108,597,000
May 27	3,585,250	3,405,000	278,289,000	84,152,000	26,992,000	109,386,000
June 24	3,452,800	3,430,000	272,297,000	81,733,000	30,239,000	111,726,000
July 29	3,539,100	3,460,000	268,513,000	77,887,000	34,900,000	114,053,000
August 5	[1]3,909,400	3,445,000	268,982,000	76,431,000	35,601,000	114,512,000
August 26	[9]1,690,800	3,475,000	246,982,000	73,475,000	37,722,000	116,237,000
September 30	3,658,200	3,560,000	233,023,000	71,168,000	38,081,000	115,466,000
October 7	3,435,850	3,505,000	231,564,000	[6]71,152,000	38,549,000	114,397,000
October 21	3,771,550	[1]3,650,000	[2]229,127,000	72,122,000	39,358,000	115,060,000
October 28	3,498,500	3,520,000	230,453,000	72,660,000	39,562,000	114,786,000
November 25	3,818,100	3,510,000	231,811,000	75,595,000	38,527,000	112,106,000
December 30	3,545,000	3,445,000	237,742,000	80,985,000	34,184,000	106,680,000
1940:						
January 27	3,611,600	3,470,000	237,339,000	87,914,000	27,407,000	103,015,000
February 3	3,498,800	3,395,000	239,380,000	89,337,000	26,861,000	102,536,000
February 10	3,688,100	3,460,000	239,510,000	91,649,000	26,007,000	102,344,000
February 17	3,717,950	3,570,000	238,928,000	93,985,000	25,876,000	103,424,000
February 24	3,732,100	3,490,000	240,836,000	96,719,000	25,390,000	103,419,000
March 2	3,798,250	3,445,000	244,126,000	98,364,000	25,015,000	103,521,000
March 9	3,828,550	3,450,000	245,762,000	99,397,000	24,560,000	103,825,000
March 16	3,890,050	3,500,000	246,762,000	100,616,000	24,075,000	103,588,000
March 23, 1940	3,871,450	3,560,000	.....	[1]101,298,000	23,275,000	102,798,000
March 25, 1939	3,382,350	[8]3,191,000	[4]273,345,000	86,700,000	26,629,000	109,872,000
Change in past year	+14.4%	+11.5%	—9.7%	+16.8%	—12.6%	—6.4%

[1] All time peak. [2] Peak for 1939. [3] Lowest since April, 1922. [4] Stocks, March 18, 1939. [5] Peak prior to 1939. [6] Lowest for year. [7] Prior to April 29, 1939, data did not include stocks at terminals, in transit, etc., except in California. [8] March, 1939, daily average. [9] Lowest since October 1922, due to the shutdown of six Mid-Continent states.

PRODUCT PRICES

REFINED GASOLINE

	Range Late Last Week (Cents a gal.)		Changes from Week Before	
Oklahoma Refineries:				
62 Octane and under	3¾	4⅛	...	...
63-66 Octane	4	4⅜	...	...
67-69 Octane	4¼	4¾	...	...
70-72 Octane	4½	5	...	...
Mid-Western Tank Car:				
62 Octane and under	3¾	4⅛	...	...
63-66 Octane	4	4⅛	...	...
67-69 Octane	4¼	4¾	...	...
70-72 Octane	4½	5	...	...
New York Harbor:				
70 Octane and under	6¼	6¾	...	...
72-74 Octane	6¼	7¼	...	...

NATURAL GASOLINE

Grade 26-70:				
F. O. B. Group 3	1½	1¾	—¼	...
F. .O. .B. Breckenridge, Texas	1¼	...	...	—¼

KEROSENE

Oklahoma Refineries:				
41-43 water white	3⅞	4¼	...	...
42-44 water white	4	4⅜	...	...
Mid-Western Tank Car:				
41-43 water white	3⅞	4¼	...	...
42-44 water white	4	4⅜	...	...
New York Harbor:	6	6½	...	...

RANGE OIL

At Oklahoma Refineries	3⅝	3⅞	...	...
In Mid-Western Market, Group 3 basis	3¾	4	...	...

LIGHT FUEL OILS

Oklahoma Refineries:				
No. 1 straw	3⅜	3¾	...	...
No. 3	3¼	3⅜	...	...
Mid-Western Tank Car:				
No. 1 straw	3½	3⅝	...	...
No. 3	3¼	3⅜	...	...
New York Harbor:				
No. 1	6	6½	...	...
No. 3	5½	5⅝	...	...

HEAVY FUEL OILS (Per Barrel)

Oklahoma Refineries:				
No. 6	50	50	...	...
Mid-Western Tank Car:				
No. 5	75	75	...	...
No. 6	45	55	...	...
New York Harbor:				
No. 5	$1.70	$1.85	...	...
No. 6	1.50	1.50	...	...

BUNKER C FUEL OIL (Per barrel, ships bunkers)

Gulf Coast	$ .90	$1.00	...	...
New York Harbor	1.50	1.50	...	...

DIESEL OIL (Per barrel, ships bunkers)

Gulf Coast	$1.70	$1.70	...	...
New York Harbor	2.20	2.35	...	...

LUBRICATING OIL

Oklahoma Refineries:				
Bright stock, 150-160 viscosity at 210°, 10-25 pour test	20	24½	...	...
Neutral oil, pale, No. 3 color, 150 viscosity at 100°, 0-10 pour test	10½	13¾	...	...
Western Pennsylvania:				
Bright stock, 145-155 viscosity, at 210°, 25 pour test	23	25	...	...
Neutral oil, No. 3 color, 150 viscosity, at 70°, 25 pour test	24	24	...	...

Gasoline goes to storage; fuel oils are withdrawn

Despite the arrival of spring, statistical trends in the old industry have continued as in the winter, gasoline stocks having expanded further in the week ended March 23 and withdrawals having been made from fuel oil storage. Meanwhile, both crude oil production and refinery runs have remained high.

Production and Runs

United States production of crude came down nearly 20,000 barrels in the week of March 23, having averaged 3,871,450 barrels daily, according to the American Petroleum Institute. But the output still was not far under the all time peak of a little over 3,900,000 barrels a day that was reached last August, and it exceeded by approximately 375,000 barrels the estimated average daily market requirements for March. The crude production was 14.4 percent greater than in the corresponding week last year.

Crude runs to stills were stepped up 60,000 barrels to 3,560,000 barrels daily, and then were 11.5 percent above the daily average for March last year. The runs have been far above economic levels.

Gasoline Situation

Production of gasoline was 80,000 barrels greater than in the previous week, having amounted to 11,452,000 barrels in the 7 day period.

Stocks of gasoline rose further, and again established an all-time record, having amounted to 101,298,000 barrels at the end of the week, compared with 100,616,000 barrels a week earlier, an increase of 682,000 barrels. The stocks then were approximately 14,500 barrels, or 16.8 percent, higher than a year previously, when they totaled 86,700,000 barrels. The present inventory embodies about 20,000,000 barrels more than the estimated necessary working stocks of around 82,000,000 barrels as of March 31. Whereas the gasoline stocks are nearly 17 percent larger than at this time last year, when they were greater than necessary, the demand for gasoline currently is running only about 5 percent higher than a year ago.

Fuel Oils

Stocks of heating oils again were drawn upon in the week ended March 23 in supplying the continued large demand that attended more cold weather. The total inventory of gas oil and distillate fuel came down 800,000 barrels, from 24,075,000 to 23,275,000 barrels, and at the latter level was 12.6 percent smaller than the supply held a year before. Demand for the light fuel oils has been running sharply higher since last fall than it did a year previously.

Residual fuel oil appeared to be in somewhat better demand than in some recent weeks, 860,000 barrels having been withdrawn from storage. Those heavy oils have gone into storage at times lately, apparently because of the slowing down of industrial activity. The stocks stood March 23 at 102,798,000 barrels, 6.4 percent lower than at the corresponding time last year.

Crude oil has continued to go into storage under relatively high allowables in some of the Mid-Continent states, particularly Texas. The national inventory rose exactly a million barrels in the week ended March 16, having totaled 246,762,000 barrels on that date, according to the Bureau of Mines.

Crude output for week is 359,425 barrels over Bureau

United States production of crude oil during the week ended March 30 was 359,425 barrels over the Bureau of Mines estimate of demand. Production at 3,860,025 barrels daily is 25,750 barrels below that of the preceding week. Only 1200 barrels of the decline was assignable to prorated states, with Illinois accounting for most of the balance. Illinois and California led in the decline while Texas registered a normal increase.

Texas production, 1,507,150 barrels, was 14,300 barrels less than that of the week before, 58,850 barrels below its allowable of 1,566,000 barrels, and 176,550 barrels over federal suggestion.

California yield was 592,200 barrels—6100 barrels less than the previous week.

Illinois production declined 21,000 barrels from its peak of the previous week.

Oklahoma declined 11,750 barrels to 413,125 barrels; 7175 barrels below allocation.

United States Crude Oil Production

Estimates Compiled by THE OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (March)	State Allowable in Mar.	BARRELS DAILY FOR WEEK ENDED Mar. 30	Mar. 23
TEXAS—				
Texas Panhandle	.....	.....	78,400	79,900
North Texas	.....	.....	106,500	106,200
West Central Texas	.....	.....	33,350	33,300
West Texas	.....	.....	275,950	272,100
East Central Texas	.....	.....	90,850	90,150
East Texas Field	.....	.....	397,950	397,500
South Texas	.....	.....	267,950	261,350
Texas Gulf Coast	.....	.....	256,200	252,350
Total Texas	1,330,600	1,566,000	1,507,150	1,492,850
CALIFORNIA—				
Long Beach	.....	.....	43,400	45,000
Midway-Sunset	.....	.....	44,000	45,700
Kettleman Hills	.....	.....	49,350	46,700
Wilmington	.....	.....	82,950	85,200
Others	.....	.....	373,200	376,400
Total California	587,100	592,000*	592,900	599,000
ILLINOIS—				
Salem	.....	.....	264,500	283,450
Louden	.....	.....	74,800	77,000
Other New Pools	.....	.....	78,650	78,200
Old Pools	.....	.....	8,300	8,600
Total Illinois	329,700	.....	426,250	447,250
OKLAHOMA—				
Oklahoma City	.....	.....	89,450	103,150
Seminole Area	.....	.....	93,500	107,300
Others	.....	.....	230,175	214,425
Total Oklahoma	420,300	420,300	413,125	424,875
LOUISIANA—				
North Louisiana	.....	.....	68,150	68,200
South Louisiana	.....	.....	217,900	214,900
Total Louisiana	253,300	277,412	286,050	283,100
KANSAS	153,900	170,000	180,400	180,150
NEW MEXICO	103,200	114,000	114,500	114,100
EASTERN STATES—				
Pennsylvania Grade	.....	.....	73,200	75,100
Others, Eastern	.....	.....	23,500	24,000
Total Eastern States	104,600	.....	96,700	99,100
MOUNTAIN STATES—				
Wyoming	60,600	.....	71,000	70,500
Montana	15,200	.....	17,000	17,050
Colorado	3,500	.....	4,000	4,000
Total Mountain States	89,300	.....	92,000	91,550
ARKANSAS	65,500	70,000	70,250	69,850
MICHIGAN	64,800	65,000	63,100	64,750
MISSISSIPPI	1,300	.....	7,800	8,100
INDIANA	7,100	.....	9,800	11,100
‡Total 8 Prorated States	2,978,600	3,239,712	3,227,475	3,228,675
Total United States	3,500,600	.....	3,860,025	3,885,775

* Recommendation of Central Committee of California Oil Producers.

‡ Texas, California, Oklahoma, Louisiana, Kansas, New Mexico, Michigan, Arkansas.

CRUDE OIL PRICE SCHEDULES

MID-CONTINENT GRAVITY SCALE PRICES—Posted October 11-13, 1938

(Some fields of Mid-Continent have flat price postings, and are shown separately)

Gravity	[7]Okla.-Kans.	[10] North La.-Ark.	[9] Schuler, Ark. 9-13-39	North & W. Central Tex.	East Central Tex.	Gray Co. Tex.	Carson, Hutchinson Co. Tex.	[1]Tomball Tex. Type	West Tex.-New Mex.	[2]Gulf Coast (Tex.-La.) 10-2-39	[3]Some La. Gulf Areas 10-2-39	Jennings, La.	[4]Anahuac, Tex. Type 10-2-39	[5]Refugio, Tex. Type 10-2-39	[6]Mirando, Tex. Type 10-2-39	[8]Salt Creek, Wyo. (except Tensleep)
19–19.9..	.....	.....	.....	.....	.....	.....	.....	.....	*$0.53	*$0.86	*$0.86	.....	*$0.81	*$0.91	*$0.86	.....
20–20.9..	$0.60	.....	.....	.....	.....	.....	.....	.....	.55	.88	.88	.....	.83	.93	.88	$0.70
21–21.9..	.63	.....	.....	.....	.....	.....	.....	.....	.57	.90	.90	.....	.85	.95	.90	.72
22–22.9..	.66	.....	.....	.....	.....	.....	.....	*$0.95	.59	.92	.92	.....	.87	.97	.92	.74
23–23.9..	.69	.....	.....	.....	*$0.78	.....	.....	.97	.61	.94	.94	.....	.89	.99	.94	.76
24–24.9..	.72	*$0.73	*$0.63	*$0.71	.80	.....	.....	.99	.63	.96	.96	.....	.91	1.01	.96	.78
25–25.9..	.75	.75	.65	.73	.82	.....	.....	1.01	.65	.98	.98	.....	.93	1.03	.98	.80
26–26.9..	.78	.77	.67	.75	.84	.....	.....	1.03	.67	1.00	1.00	.....	.95	1.05	1.00	.82
27–27.9..	.81	.79	.69	.77	.86	.....	.....	1.05	.69	1.02	1.02	.....	.97	1.07	1.02	.84
28–28.9..	.84	.81	.71	.79	.88	*$0.72	*$0.67	1.07	.71	1.04	1.04	.....	.99	1.09	1.04	.86
29–29.9..	.87	.83	.73	.81	.90	.74	.69	1.09	.73	1.06	1.06	.....	1.01	1.11	1.06	.88
30–30.9..	.90	.85	.75	.83	.92	.76	.71	1.11	.75	1.08	1.08	.....	1.03	1.13	1.08	.90
31–31.9..	.92	.87	.77	.85	.94	.78	.73	1.13	.77	1.10	1.10	*$0.87	1.05	1.15	1.10	.92
32–32.9..	.94	.89	.79	.87	.96	.80	.75	1.15	.79	1.12	1.12	.89	1.07	1.17	1.12	.94
33–33.9..	.96	.91	.81	.89	.98	.82	.77	1.17	.81	1.14	1.14	.91	1.09	1.19	1.14	.96
34–34.9..	.98	.93	.83	.91	1.00	.84	.79	1.19	.83	1.16	†1.16	.93	1.11	1.21	1.16	.98
35–35.9..	1.00	.95	.85	.93	1.02	.86	.81	1.21	.85	1.18	.....	.95	1.13	1.23	1.18	1.00
36–36.9..	1.02	.97	.87	.95	1.04	.88	.83	1.23	.87	1.20	.....	.97	1.15	1.25	1.20	1.02
37–37.9..	1.04	.99	.89	.97	1.06	.90	.85	1.25	.89	1.22	.....	.99	1.17	1.27	1.22	1.04
38–38.9..	1.06	1.01	.91	.99	1.08	.92	.87	1.27	.91	1.24	.....	1.01	1.19	1.29	1.24	1.06
39–39.9..	1.08	1.03	.93	1.01	1.10	.94	.89	1.29	.93	1.26	.....	1.03	1.21	1.31	1.26	1.08
40+.....	1.10	1.05	.95	1.03	1.12	.96	.91	1.31	.95	1.28	.....	1.05	1.23	1.33	1.28	1.10

* Minimum price and applies also to purchases of lower gravity.

† Maximum price and applies also to purchases of higher gravity.

[1] Tomball, Raccoon Bend (Deep) and Satsuma.

[2] Includes Amelia, Barbers Hill, Big Creek, Blue Ridge, Clear Lake, Cotton Lake, Esperson, Fannett, Goose Creek, Hankamer, Lovells Lake, Lochridge, Moore, Mykawa, Nome, Orange, South Liberty, Spindle Top, Sugar Land, Thompsons, Webster, and West Beaumont.

[3] Includes Berwick Bay, Bay St. Elaine, Caillou Island, Chacahoula, Dog Lake, Edgerly, Four Isle, Gillis, Grand Bay, Hackberry, Horseshoe Bayou, Iberia, Jefferson Island, Lake Barre, Lake Pelto, Leesville, Port Barre, Starks, Timballer Bay, Quarantine Bay, and Vinton fields.

[4] Anahuac, Dickinson, Gillock, Cedar Point, Fairbanks, Turtle Bay, Hull, Orange, Pierce Junction, Batson, Caplen, Humble, North Dayton, Saratoga, Sour Lake, South Esperson, Spindle Top, West Orange, Thompson (deep), and Raccoon Bend (shallow) fields.

[5] Includes Saxet, E. White Point, Greta, O'Connor-McFadden, Taft, Plymouth and Tom O'Connor fields.

[6] Includes Duval, Jim Hogg, Webb and Zapata counties, Texas, and Heyser and Placedo fields.

[7] Oklahoma Pipe Line and Magnolia schedules.

[8] Includes La Barge, Midway Dome, Dutton.

[9] Also Buckner, Village, Magnolia.

[10] Add 10 cents for Bunkie and Eola field prices.

Mid-Continent Flat Prices

	Flat Price	Date Posted
Arkansas:		
Smackover	$0.73	10-12-38
Louisiana:		
Garden Island	1.24	10-12-38
Gibson	1.04	10-11-38
Lafitte	1.04	10-12-38
Texas:		
Cayuga	.78	10- 2-39
East Texas	1.10	10-12-38
Talco	.65	10- 2-39
Livingston, Cleveland	1.10	10-12-38
Van	.93	10-12-38
Pettus	1.29	10-12-38
Pecos County	.78	10-12-38
Pecos Shallow	.65	10-12-38
Luling	.87	10-12-38
Lytton Springs	.99	10-12-38
Salt Flat, Darst Creek, Hilbig, Carroll, Clark and Zoboroski	.96	10-11-38
Flour Bluff-Jim Wells Co.	1.23	10-11-38
Guerra	1.06½	5- 8-39
Seabreeze, Willow Slough, La Belle, Hardin, S. China	1.10	9-14-39
Clay Creek	.85	10-13-38
Conroe	1.27	10-11-38
Long Lake	1.08	10-19-38

Middle West Prices

Lima, Ohio	$0.90	10-13-38
Illinois, old fields	.95	6- 8-39
Illinois Basin	1.05	6- 8-39
Lake Centralia-Salem, Illinois	1.05	10-21-39
Princeton, Indiana	.95	6- 8-39
Griffin, Sw., Ind.-Se. Ill., Sand.	.95	10-10-39
Griffin: McClosky Lime	.90	10-10-39
Western Kentucky	.90	6- 8-39
Birk City, Western Kentucky	.90	6- 8-39
Kentucky River, Eastern Ky.	1.10	6- 9-39
Big Sandy River, Eastern Ky.	1.02	6- 9-39

Michigan Prices

	Flat Price	Date Posted
Central (Basin):		
Porter, Greendale, Crystal, Wise, Midland	$1.02	10- 9-39
Buckeye, Edenville, Bentley, Beaverton	1.00	10- 9-39
Freeman, Sherman, Clare	.97	10- 9-39
Arenac, Ogemaw, W. Branch	.87	11- 9-39
Southwest (Shallow):		
Allegan, Kent Counties	1.03	10- 9-39
Van Buren Co., Bloomingdale	1.03	11- 9-39
Zeeland	.85	10- 9-39
Bangor	.83	10- 9-39

Rocky Mountain States Prices

Colorado:		
Canon City, Ft. Collins, Wellington, Moffat and Florence	.90	10-11-38
Iles, Light	.98	10-11-38
Iles, Heavy	.92	10-11-38
Montana:		
Cat Creek	1.10	10-11-38
Cut Bank	1.00	1- 1-40
Sunburst	.90	11-16-37
New Mexico:		
Artesia	.77	10-11-38
Hogback	1.00	10-11-38
Wyoming:		
Big Muddy	.98	10-11-38
Byron	.55	10-11-38
Dry Creek	.92	10-11-38
Elk Basin	.90	10-11-38
Frannie, Light	.55	10-11-38
Frannie, Heavy	.42	10-11-38
Garland	.50	10-11-38
Grass Creek, Light	.90	10-11-38
Grass Creek, Heavy	.40	10-11-38
Hamilton Dome	.35	10-11-38
Lance Creek	.77	10-11-38
Mill Creek	.72	10-11-38
Oregon Basin	.50	10-11-38
Osage	1.30	10-11-38
Poison Spider	.59	10-11-38
Rock Creek	1.00	10-11-38
Tensleep	.646	10-11-38

Pennsylvania Prices

	Flat Price	Date Posted
Bradford-Allegany	$2.75	1- 1-40
National Transit Lines	2.75	1- 1-40
Sw. Pa. Pipe Line	2.40	1- 1-40
Eureka Pipe Line	2.34	1- 1-40
Corning Grade, Ohio	1.12	11- 4-39

Major Price Changes

	Penna. (Nat. Tr.)	Mid-Cont. (36 Gr.)	Calif. (26 Gr.)
June 19, 1933	Up 10	Up 19	.....
June 26, 1933	Up 10	.....	Up 9-12
July 6, 1933	Up 13	Up 10	.....
July 17, 1933	Up 15	.....	.....
July 28, 1933	Up 15	.....	.....
Aug. 11, 1933	Up 10	.....	.....
Aug. 24, 1933	.....	Up 10	.....
Aug. 30, 1933	Up 15	.....	.....
Sept. 6, 1933	Up 10	Up 10	Up 15
Sept. 8, 1933	.....	Up 15	.....
May 1, 1934	Up 10	.....	.....
Nov. 6, 1934	Cut 25	.....	.....
Dec. 6, 1934	Cut 25	.....	.....
Jan. 4, 1935	Up 15	.....	.....
Feb. 4, 1935	Up 15	.....	.....
May 16, 1935	Cut 15	.....	.....
June 26, 1935	Cut 15	.....	.....
July 16, 1935	Cut 10	.....	.....
Aug. 29, 1935	.....	.....	Cut *1
Sept. 6, 1935	Up 5	.....	.....
Oct. 29, 1935	Up 15	.....	.....
Nov. 1, 1935	.....	.....	Up *28
Nov. 18, 1935	Up 15	.....	.....
Dec. 6, 1935	.....	.....	Up *9
Jan. 9, 1936	.....	Up 10	.....
Jan. 13, 1936	Up 15	.....	.....
Mar. 7, 1936	.....	.....	Up *18
Dec. 28, 1936	Up 12	.....	.....
Jan. 28, 1937	.....	Up 12	.....
Feb. 24, 1937	Up 10	.....	.....
June 7, 1937	Up 15	.....	.....
Sept. 1, 1937	Cut 22	.....	.....
Oct. 12, 1937	Cut 25	.....	.....
Dec. 1, 1937	Cut 15	.....	.....
March 7, 1938	Cut 17	.....	.....
June 13, 1938	Cut 25	.....	.....
Sept. 1, 1938	Cut 12	.....	.....
Oct. 11, 1938	.....	Cut 20	.....
Jan. 21, 1939	Up 12	.....	.....
Feb. 2, 1939	Up 8	.....	.....
March 6, 1939	Up 12	.....	.....
Oct. 6, 1939	Up 25	.....	.....
Nov. 1, 1939	Up 15	.....	.....
Dec. 1, 1939	Up 10	.....	.....
Jan. 1, 1940	Up 25	.....	.....
Feb. 1, 1940	.....	.....	Cut *7

* Signal Hill 26 gravity.

Crude Production Taxes

Oklahoma—Five percent of gross value less royalty interests.
Texas—2¾ cents or 2¾ percent, whichever is higher.
Louisiana—From four to 11 cents a barrel, depending upon gravity.
Arkansas—2.6 percent of gross market value.
Montana—Two percent of gross value at well and ⅝ of 1c per barrel.
New Mexico—Severance tax of 2 percent on oil and gas.
Wyoming and New Mexico—Production tax based upon state and county assessments.
California—.66443 mills per barrel of oil produced and 17.39 cents an acre on proved lands.

Fifteen-year crude purchase contract expires in West Texas

The oldest and largest contract involving West Texas crude expired April 1 after netting a price bonus to the two producing companies in the Big Lake field on approximately 90,000,000 barrels. This contract brought the first trunk line into the district, and made it possible for the Permian lime to demonstrate its productiveness, thereby opening up development of one of the state's leading producing regions.

Humble Oil & Refining Company has fulfilled its contract, dated November 15, 1924, to purchase a maximum of 20,000 barrels of crude daily from Reagan County Purchasing Company, owned jointly by Plymouth Oil Company and Continental Oil Company. Reagan County Purchasing Company holds contract to run and purchase a like amount from the Big Lake field for the life of the properties. The subcontract, terminated April 1, resulted in Humble Pipe Line Company entering the district with an 8-inch extension from the Ranger district. First runs were made by the trunk line April 4, 1925.

Under the terms of the oil purchase deal, Humble Oil & Refining Company paid Reagan County Purchasing Company 20 cents per barrel for gathering and delivering the crude to Humble Pipe Line Company's Kempner station and tank farm, situated near the Big Lake field. The former also assumed Reagan County Purchasing Company's obligation to pay the average posted price of The Texas Company, Prairie Oil & Gas Company (now Sinclair Prairie Oil Marketing Company), Gulf Oil Corporation, Magnolia Petroleum Company and Humble Oil & Refining Company in Kansas, Oklahoma, and that portion of Texas lying north of a line extending via Laredo, San Antonio, Austin and Nacogdoches.

During the life of the 15-year contract, Big Lake field producers received from 5 to 60 cents per barrel above the prevailing posted price schedule applying to West Texas fields. The field has settled to 6300 barrels of crude daily, averaging 39-gravity through the blending of Permian and Ordovician oil.

Humble Oil & Refining Company has offered to continue purchasing the field's entire output, according to reports, paying its regular West Texas price scale, plus 5 cents per barrel gathering to Reagan County Purchasing Company.

Ask 5-acre spacing for LaVernia, Guadalupe County

Land owners in the La Vernia, or Elm Creek field, Guadalupe County, requested 5-acre spacing at a hearing before the Texas Railroad Commission last week. No operators attended the meeting.

The field was opened in November, 1939, and produces from approximately 700 feet. Production is from the Escondido section of the Navarro formation, averaging between three and five barrels per well.

Aransas Pass field order permits acreage pooling

One of the most unusual proration orders of the Texas Railroad Commission has been issued for the Aransas Pass field, Aransas and San Patricio counties. It provides that operators may pool non-contiguous tracts for proration purposes, a plan advocated by Shasta Oil Company at a hearing before the commission recently.

The order, however, does not make it possible to allocate production to a well from tracts remote from each other. The order provides:

"Tracts of less than 10 acres may be pooled so as to make a 10-acre unit when such smaller tracts are not more than 750 feet apart from boundary line to boundary line, provided, however, that all acreage assigned to a producing well under this order shall be located within a radius of not more than 990 feet from a well producing from the same sand as the well to which such acreage is assigned is producing, and providing further that if it is afterwards conclusively established that one of such smaller tracts is non-productive then from that time forward such condemned acreage shall have no consideration in the proration formula provided for in the field rules."

Five-acre spacing for Lewis

Five-acre spacing for wells in the Lewis field, Jones County, is provided in an order issued by the Texas Railroad Commission. Wells may be spaced 220 feet from lease lines and 440 feet apart.

CALIFORNIA CRUDE OIL PRICES

Posted effective February 1, 1940. All gravities above those quoted take highest price offered in that field.

Gravity	Wilmington	Signal Hill (Long Beach), El Segundo	Seal Beach	Huntington Beach	Inglewood	Playa del Rey	Olinda, Brea, Canon	Athens-Rosecrans	Elwood Terrace	Torrance	Richfield	Whittier, East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Newhall, McKittrick, Kern River, Round Mt., Kern Front	Greeley, Canal	Coles Levee, Richfield Western	Mountain View	Elk Hills, Buena Vista Hills, Midway-Sunset, Lakeview Area	Lost Hills	Coalinga	Wheeler Ridge	Kettleman Hills
14-14.9...	$0.60	$0.65	$0.64	$0.63	$0.64	$0.65	$0.61	....	....	$0.65	$0.61	$0.61	$0.62	$0.63	....	$0.60	....	....	....	$0.60	$0.60	$0.60	....	....
15-15.9...	.60	.65	.64	.63	.64	.65	.61	....	....	.65	.61	.61	.62	.63	....	.60	....	....	....	.60	.60	.60	....	....
16-16.9...	.60	.65	.64	.63	.64	.65	.61	....	....	.65	.61	.61	.62	.63	....	.60	....	....	....	.60	.60	.60	....	....
17-17.9...	.62	.65	.64	.63	.68	.65	.61	....	....	.65	.61	.61	.62	.63	....	.60	....	....	....	.60	.60	.60	....	....
18-18.9...	.64	.65	.64	.63	.71	.65	.65	....	....	.68	.61	.61	.62	.63	....	.60	....	....	....	.60	.60	.60	....	....
19-19.9...	.69	.69	.64	.67	.75	.70	.69	....	....	.72	.61	.65	.62	.63	....	.60	....	....	$0.60	.64	.64	.61	$0.60	....
20-20.9...	.73	.73	.64	.72	.79	.76	.74	....	....	.75	.65	.69	.62	.67	....	....	....	....	.60	.69	.69	.62	.60	....
21-21.9...	.78	.78	.64	.76	.82	.81	.78	....	....	.79	.69	.73	.62	.72	$0.63	....	....	....	.64	.74	.74	.66	.60	....
22-22.9...	.82	.82	.69	.81	.86	.86	.82	....	....	.82	.73	.77	.66	.76	.63	....	....	....	.68	.79	.78	.70	.63	....
23-23.9...	.86	.86	.75	.85	.89	.92	.86	$0.71	....	.86	.78	.82	.71	.81	.67	....	....	....	.71	.84	.82	.74	.67	....
24-24.9...	.90	.90	.80	.90	.93	.97	.90	.77	....	.89	.82	.86	.75	.85	.72	....	....	....	.75	.89	.86	.78	.71	....
25-25.9...	.95	.95	.86	.94	.96	1.02	.95	.82	....	.93	.86	.90	.80	.89	.77	....	....	....	.79	.94	.90	.82	.75	....
26-26.9...	.99	.99	.91	.99	1.00	1.08	.99	.88	....	.96	.90	.94	.84	.94	.82	....	....	....	.83	.99	.95	....	....	....
27-27.9...	1.03	1.03	.97	1.03	1.04	F.O.B.	1.03	.94	....	1.00	.94	.98	.89	.98	.87	....	$0.83	$0.92	.87	1.04	.99	....	....	....
28-28.9...	1.07	1.07	1.02	1.07	1.07	Pipe Line	1.07	.99	....	1.03	.98	....	.93	1.02	.91	....	.86	.96	.91	1.09	1.03	....	....	....
29-29.9...	1.10	1.10	1.07	1.11	1.10	....	1.10	1.04	....	1.06	1.02	....	.98	1.06	.96	....	.90	.99	.95	1.14	1.07	....	....	....
30-30.9...	1.14	1.14	1.12	1.15	1.14	....	1.14	1.09	F.O.B.	1.09	....	....	1.02	1.10	1.01	....	.94	1.02	.99	1.19	1.11	....	....	....
31-31.9...	....	....	....	....	1.17	....	1.17	1.14	Ship	....	....	....	1.07	1.14	1.05	....	.98	1.06	1.02	1.24	....	....	....	....
32-32.9...	....	....	....	....	1.20	....	1.20	1.19	....	....	....	....	1.11	1.18	1.09	....	1.02	1.09	1.06	1.29	....	....	....	....
33-33.9...	....	....	....	....	....	....	....	1.24	$1.21	....	....	....	1.15	1.22	1.14	....	1.06	1.13	1.10	1.34	....	....	....	$1.12
34-34.9...	....	....	....	....	....	....	....	1.29	1.25	....	....	....	1.20	1.26	1.19	....	1.10	1.16	1.14	....	....	....	....	1.17
35-35.9...	....	....	....	....	....	....	....	1.34	1.29	....	....	....	1.24	....	1.23	....	1.14	1.20	....	....	....	....	....	1.21
36-36.9...	....	....	....	....	....	....	....	1.39	1.33	....	....	....	1.28	....	1.27	....	1.18	1.23	....	....	....	....	....	1.25
37-37.9...	....	....	....	....	....	....	....	1.44	1.37	....	....	....	1.33	....	1.31	....	1.22	1.26	....	....	....	....	....	1.29
38-38.9...	....	....	....	....	....	....	....	1.49	....	....	....	....	1.37	....	1.36	....	1.25	1.30	....	....	....	....	....	1.33
39-39.9...	....	....	....	....	....	....	....	1.54	....	....	....	....	1.42	....	....	....	1.29	1.34	....	....	....	....	....	1.38
40-40.9...	....	....	....	....	....	....	....	1.59	....	....	....	....	1.46	....	....	....	1.33	1.37	....	....	....	....	....	....
41-41.9...	....	....	....	....	....	....	....	....	....	....	....	....	1.50	....	....	....	1.37	1.40	....	....	....	....	....	....
42-42.9...	....	....	....	....	....	....	....	....	....	....	....	....	1.54	....	....	....	1.41	1.44	....	....	....	....	....	....
43-43.9...	....	....	....	....	....	....	....	....	....	....	....	....	1.59	....	....	....	1.45	1.47	....	....	....	....	....	....
44-44.9...	....	....	....	....	....	....	....	....	....	....	....	....	1.63	....	....	....	1.49	1.51	....	....	....	....	....	....
45-45.9...	....	....	....	....	....	....	....	....	....	....	....	....	1.67	....	....	....	1.53	1.54	....	....	....	....	....	....
46-46.9...	....	....	....	....	....	....	....	....	....	....	....	....	1.71	....	....	....	1.57	1.57	....	....	....	....	....	....
47-47.9...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.61	....	....	....	....	....	....	....
48-48.9...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.64	....	....	....	....	....	....	....

U. S. FIELD OPERATIONS

Illinois

Devonian lime yields large wells at Centralia townsite

Centralia, Ill.—Completion of a record well and several larger-than-usual producers in the Centralia field of Marion and Clinton counties featured Illinois development.

The record well is Scott-Carey's Abernathy 1, in the north end of the townsite field, Lots 4 and 5, Block 4, Second Home Terrace, which flowed 495 barrels in 3 hours after a 750-gallon acid treatment. Pay was cored at 2911-17 feet, and casing cemented at 2904 feet.

West of production, Algona Oil Company's Marshall 1, SE 12-1n-1w, found Devonian pay at 2929-39 feet, and flowed 2450 barrels in 24 hours after acidization. North of production and west of the city W. C. McBride completed Allison 8, NE 12-1n-1w, with a gauge of 520 barrels in 4 hours. It topped Cypress at 1215 feet, Renault at 1372 feet, St. Genevieve at 1520 feet, Rosiclare at 1550 feet, Fredonia at 1568 feet. St. Louis at 1635 feet, Salem at 1762 feet, Osage at 2195 feet, Chattanooga at 2802 feet, Devonian at 2871 feet, and had pay at 2913-18 feet.

A Crawford County wildcat, near Robinson, LaSalle Drilling Company's Berryhill 1, C NE NE 9-6n-13w, was testing St. Louis lime at 1706-35 feet, and McClosky at 1505-13 feet after perforating. It was drilled to Devonian, found water, plugged back to the Salem, which also carried water, and was then plugged back to St. Louis lime.

A Perry County wildcat, Magnolia Petroleum Company's Bruns 1, SE SE NW 15-4s-3w, was abandoned through McClosky lime at 1561 feet after drilling a stain of oil at 1400 feet in a sand formation.

A north Devonian outpost in the Lake Centralia-Salem field of Marion County, Kingwood Oil Company's Shanafelt 4-C, NW 16-2n-2e, flowed 40 barrels of oil and 60 barrels of water an hour after drilling plug following a squeeze job. Casing was perforated at 3524-43 feet, and bottom is at 3596 feet. Another squeeze job probably will be run. W. C. McBride, Inc., was preparing to perforate casing at 2300 feet at N. L. Lee 20, Section 16-2n-2e, to test a show of oil in the Salem lime following a plug-back from 2396 feet. The horizon is not now productive in the field.

In Hamilton County, Kingwood Oil Company's Dodd 1, offset to the company's pool opening Wilson 1, a 100-barrel Cypress sand well, was drilling below surface pipe. Location is SE SE NW 6-6s-7e.

A Jefferson County wildcat, Magnolia Petroleum Company's Lettie Jones 1, NE 10-3s-2e, was coring Rosiclare at 2670 feet. No shows had been encountered. Another wildcat test in the county, R. C. Young's H. O. Whittington 1, SE SE SW 30-4s-3e, was drilling at 762 feet.

Carter Oil Company's Seaman 1, NW NE SW 25-12n-7e, Coles County, was drilling Trenton lime at 4472 feet. No shows have been reported in the Trenton. The wildcat topped Glen Dean at 1654 feet Cypress at 1755 feet, Weiler at 1760 feet, Aux Vases at 1966 feet, Salem at 2221 feet, Carper sand at 3018 feet, and Devonian at 3170 feet. It will be drilled to the St. Peter.

Deepest test in the Illinois basin, Pure Oil Company's Stella Billington 3, C SE NE 27-1n-7e, Cisne field, Wayne County, at an elevation of 446, was drilling in Trenton lime at 5932 feet. It also will be carried to the St. Peter, expected below 7000 feet.

In Franklin County C. C. Massey has located a 3000-foot McClosky test, C. F. Downen 1, C SW SW 26-7s-4e.

Biggest completion reported during the week was The Texas Company's Dunning 12, SE SE SE 30-2n-2e, Lake Centralia-Salem field, Marion County, which flowed 864 barrels in three hours from 3397 feet. The company also staked location for a north outpost to the field, Altvater 1, SE 9-2n-2e.

Indiana

Gibson County wildcat spuds; Jay County test deepening

Evansville, Ind.—A. W. Cherry and Barron Kidd's William Dunn 1, SE SW NE 17-3s-13w, Gibson County wildcat, was preparing to spud. It is 1¼ miles northwest of R. W. O'Meara and H. M. Horton's Amanta Maier 1, SE NE SW 21-3s-13w, which had been abandoned at 2984 feet with no shows through McClosky. D. & H. Drilling Company is contractor for the new test.

In eastern Gibson County, Barton Township, each of Mackey, Al Walker set 5-inch at 150 feet in Oscar Schmidt G-1, NE NW 24-3s-9w. To the north, preparing to spud was C. B. Sowell's Schoonover 1, SW SE SW 13-3s-9w, just 120 feet off a lease of Tide Water Associated Oil Company.

In Jay County, Jackson Township, Petroleum Development Corporation's Jacob Binegar 1, NE NW 29-24n-13e, got Blue Lick sulphur water but was reported drilling ahead to the contract 4000-foot mark.

Carlisle Williams (Illind Oil Company) was locating Elinor Walker 1, E½ NW 7-8s-6w, Spencer County, a Superior Oil Company farm-out, ¾ mile southwest of Rockport oil production.

O. L. Sturbois' Ethel May Boyd 2,

The unpredictable Wabash River has proved an expensive headache for many operators in Griffin field, spanning the river in Southern Illinois and Indiana. To offset shut-downs occasioned by high water, many pump jacks have been housed in an elevated "dog-house." This has boosted the lifting cost on some wells from $1000 to $1500.

NE NE 31-7s-6w, Spencer County, southwest of the first oil well in the area, had oil saturation at 918-24 feet, and was deepening.

In Sullivan County, J. I. Darst et al located R. Crowder 1, SW SW SW 3-7n-9w.

Temporarily abandoned after several unsuccessful attempts to shut off water in the Cypress was D. M. Hollingsworth and Joe Minton's L. P. Hill 1, SE NW 7-4s-13w, southeast of Griffin, Posey County.

Kentucky

To test Devonian in Hancock County shallow pool

Owensboro, Ky.—Jack Reed et al's Motley 1, projected St. Peter test, northwestern Allen County, Section 5-D-40, near the old Gainesville pool, shut down at 1750 feet for rig repairs.

Another wildcat will test the Devonian in the old shallow Hawesville pool of Hancock County, W. F. Fleshers' Mineral Reserve 18.

Abandoned at 900 feet was Imperial Oil & Gas Company's J. R. Williams 1, near Zion, Henderson County. In the Corydon section, Sun Oil Company's George Trigg 3 was drilling at 1300 feet.

A mile east of Browns Valley, Daviess County, in the Utica pool area, Miller & Shirellas Crutcher 1, Section 25-O-30, abandoned at 1742 feet, dry through the McClosky.

A projected Devonian wildcat was located in Todd County, 7 miles north of Elkton, Noe and Myers' Harris 1.

In Meade County, 9 miles southeast of Brandenburg, Northern Oil Corporation's Greenwall 1, wildcat, was abandoned at 1400 feet after getting sulphur water at 1360 feet.

Illinois permits

Permits for 68 wells were granted by the Illinois State Department of Mines and Minerals last week, a gain of 10 over the previous week.

Clinton County led with 20 permits, followed by Marion County with 19, Fayette County with 16, White County with 7, and Bond, Clay, DeWitt, Hardin, Wabash and Wayne counties with 1 each.

Oklahoma

New crude pools opened in Seminole and Lincoln counties

Tulsa.—Stanolind Oil & Gas Company's Aldridge 2, NW NE SE 32-9n-8e, flowed 430 barrels of 40-gravity crude in 24 hours to open a new Seminole County pool, 3 miles south of Bethel pool. Wilcox sand was topped at 4370 feet. Marshall at 4382 feet, and hole was carried to 4394 feet in the dolomite. It was shut in for a pipe line outlet.

Summit Drilling Company et al's Cleer 1, C W½ SE SW 6-15n-5e, 6 miles northwest of Davenport pool, flowed 367 barrels of 43.5-gravity oil in 10½ hours to open a new Lincoln County pool. On this gauge, 5,000,000 cubic feet of gas showed with 59 barrels of water. The water is rapidly exhausting itself. Prue sand was shot with 200 quarts at 3510-50 feet. Both Oswego and Wilcox zones were dry. Associated in this 1200-acre community project with Summit Drilling Company are Deep Rock Oil Corporation, Sinclair-Prairie Oil Company, The Carter Oil Company, Mid-Continent Petroleum Corporation, Brookhaven Oil Company, all of Tulsa, and Beaty & Company, Houston. Cleer 1 is shut in, awaiting an outlet.

Continental Oil Company located Chitwood 1 as a wildcat flanking the Nemaha ridge trend in Logan County. In NEc SW 15-16n-4w, 3 miles south of Crescent pool, it will seek Wilcox production. Both Continental Oil Company and The Carter Oil Company have seismographed the area, and the test is on an expiring lease of the latter company. Wildcatting has been active along the entire length of this anticline, stretching from the Moore pool in Cleveland County and arching northeast through the Mervine pool in Kay County. Failures have been plentiful, but many small pools have been discovered.

New Gas Pool in Seminole

W. A. Mason et al's Reid 1-A, NWc NE 13-9n-7e, a mile west of Bethel pool, Seminole County, was completed to open a new gas area. Senora sand was topped at 2251 feet, and hole carried to 2294 feet. The wildcat tested 3,500,000 cubic feet of gas with a spray of oil. George Pace et al abandoned Cahill 1, C E½ NE SW 2-6n-8e, at 2917 feet. Three sands, Senora at 1320 feet, Booch at 2753 feet, and Calvin failed to show. It is 3 miles east of Spaulding pool, Hughes County. Jones Associated Oil Company abandoned Thompson 1, NWc SW 28-15n-5e, wildcat 2 miles north of Davenport pool, Lincoln County. Prue sand at 3495-3539 feet was dry.

Bryan Petroleum Company was testing a new pool strike, Ah-Sey 1, NE NW NE 34-14n-7e, 5 miles south of Stroud pool, Creek County. It pumped 40 barrels in 24 hours from Prue sand at 2556-68 feet. Hole is bottomed at 2652 feet. The sand may be shot before completion.

Gled Oil Company et al's Watkins 2, NW SW NW 20-7n-17w, a north offset to the Hobart pool discovery, Kiowa County, reported a good show of gas at 1007 feet and was drilling below 1060 feet. Shell Oil Company extended Hobart northwest one location with Ratliff 3, SE SW NE 19-7n-17w, which flowed 31½ barrels the first hour, 32½ the second, and 32 barrels the third hour. Lime was topped at 1126 feet and drilled to 1201 feet. Pay was acidized with 5000 gallons.

Five miles west of Hobart pool, A. E. DeBolt spudded Phipps 1, SWc SE 27-7n-18w, rotary test on a 720-acre block. Southwest of this test, Royalty Service Company et al's Huff 1, SWc NW 32-7n-18w, missed the lime pay and was rotating below 1400 feet. Sinclair Prairie Oil & Gas Company's Watkins 1, SE NE NW 19-7n-17w, ½ mile northwest of production, reported a show of gas at 1037 feet and was drilling below 1075 feet in lime and shale.

Electric Log Run at Littel 1

Pure Oil Company's Littel 1, C W½ NE SE 28-5s-7e, Cumberland discovery in Madill County, cored to 5580 feet in the McLish zone, top corrected at 5502 feet, and will run electric log for the third time. Salty sand was showing at the base of the McLish.

Activity is high in Byars pool, McClain County, as Stanolind Pipe Line Company completed its new lateral to the pool. Trend has been north and east. Benedum-Trees' Bond 1, SW NE SE 9-5n-3e, flowed 665 barrels in 24 hours through ½-inch tubing choke, extending the pool one location northward. Location was immediately staked for Bond 2, SE NE SE 9-5n-3e, an east offset. E. H. Moore was drilling Harman 1, NWc 15-5n-3e, one location east of production. Patsy Oil Company's Bond 2, NEc 9-5n-3e, flowed 147 barrels in 15 hours through a tubing choke. Viola and Trenton limes are pay horizons in this pool, around 3400-3500 feet.

Kansas

Small extensions given seven pools in five counties

Wichita—E. B. Shawver et al extended Rock pool, Cowley County, ½-mile south at Davis 1, NE NW NE 21-30-4e, when it flowed 10 barrels hourly, increasing to 20 barrels after a 20-quart nitro shot. Bartlesville sand was topped at 2751 feet and 42 feet of saturation was drilled. Atlantic Refining Company and Sinclair Prairie Oil Company's Smith 1, SEc NW 33-33-4e, wildcat southeast of South Rainbow Bend pool, was abandoned in Arbuckle lime at 3699-3736 feet.

Two Russell County pools received extensions. Jones & Shelburne moved Greenville pool a ¼-mile northwest at Kuhnle 3, CNL SE NW 4-15-12w. After acid, the well established a potential of 3000 barrels daily. Kansas City lime was drilled to 3046 feet. Coralena Oil Company's Hinderliter 1, CWL SW SW 28-15-13w, ¼-mile east of Trapp pool, was completed for 2460 barrels daily. Pay is Arbuckle lime at 3352 feet.

Gulf Oil Corporation extended Wilkens pool, Ellsworth County, ½-mile to the northwest as Mehl 1, CS½ SE NW 18-17-9w, rated the maximum drawdown potential of 3000 barrels from the Arbuckle lime. Harbar Drilling Com-

pany et al's Shutts 1, C N½ NW NE 32-11-17w, ¼-mile south of Bemis-Shutts pool, was drilling in saturated Arbuckle lime at 3600-05 feet.

C. F. Myers et al's Barnes 1, SWc NW 28-34-5e, 5 miles southwest of Rahn pool, Cowley County, was dry at 3510 feet in Arbuckle lime. Arbuckle lime production was extended ½-mile southeast at Gulf Oil Corporation's St. Aubyn 1, NEc 1-15-15w, Big Creek pool in Russell County. Hole filled 1600 feet with oil and swabbing test was underway.

Cities Service Oil Company's Stoskopp 2, NWc SW 17-16-13w, extended Trapp pool in northern Barton County ¼-mile southeast, pumping 91 barrels daily. Arbuckle lime was drilled to 3389 feet. Republic Natural Gas Company's Mattson 1, CSL SW SW 19-20-5w, flowed 35 barrels hourly through 5½-inch casing, extending Bornholdt pool, McPherson County, ¼-mile to the north. Mississippi chat is the pay for this pool.

E. T. Lindsay and Bells-Wells Oil Company moved in rotary at LeBlanc 1, C S½ SW NW 35-6-1w, 8 miles northeast of Aurora in Cloud County, north Kansas. Core drilling crews and seismograph parties worked the area. Location is on a farm-out from the Carter Oil Company. Nearest oil production is the Lindsborg pool, McPherson County, 70 miles south. Few tests have been drilled to great depth in the Salina Basin.

Ellis County

Dickey Oil Company will begin operations at Stone 1, CNL NE SW 4-11-17w, 2 miles northeast of Burnett pool, Ellis County. A large area has been blocked by the company. Skelly Oil Company has a rotary rig at Jensen 1, CEL NE SE 22-12-18w, ¼-mile west of Koblitz pool, Ellis County. H. K. Beardmore et al's Talsky 1, CEL SE NE 8-16-10w, was a wildcat location north of Stoltenberg pool, Ellsworth County. Offsetting this test, Magnolia Petroleum Company will drill Kalicky 1, CWL SW NW 9-16-10w. Gulf Oil Corporation's Loula 1, CEL SE NE 28-16-10w, ¼-mile south of production, was rigging up rotary. I. W. Murfin et al's Lille 1, C S½ SE SE 30-16-10w, 1½ miles west of South Stoltenberg pool, was a location.

Magnolia Petroleum Company had rotary up at Smith 1, CWL SW SE 1-19-11w, a mile south of Bloomer pool, Barton County. One mile from Otis-Albert, The Ohio Oil Company was spudding Brack 1, CNL NW 21-18-15w.

Skelly Oil Company's Valenta 1, CEL SE NE 31-16-11w, ¼-mile north of Krier (Arbuckle) pool, was drilling below 1000 feet. Saco Oil Company had tools on location at Habiger "B" 1, SE SW SE 12-19-10w, ¼-mile from Bredfeldt West pool, Rice County. Hartman & Blair have cable tools at Falkingham 1, CNL NW SE 22-30-4e, a mile south of Rock pool, Cowley County. I. W. Murfin et al's Jarvis 1, CNL SW NE 19-31-5e, 3½ miles east of Hittle pool, Cowley County, was a new location. Gulf Oil Corporation was drilling Denning 1, CNL NW NW 28-32-5e, a wildcat in the Tisdale gas area. Southeast of Vaughn pool ½-mile and ½-mile northeast of Big Creek East pool, Russell County, Hayes & Anschutz had cable tools at Becker 1, SWc NW 29-14-14w.

High court upholds Illinois in railroad land dispute

Right of the trustee of Missouri-Illinois Railroad Company to drill for oil under lands along its right-of-way in Illinois was affirmed March 25 by the United States Supreme Court in reversing a decision of the Eighth Circuit Court of Appeals in cases brought by Magnolia Petroleum Company and The Ohio Oil Company.

Principal points involved in the case were whether the railroad had fee ownership of the lands along its right-of-way and whether a bankruptcy court has summary jurisdiction to adjudicate ownership of the right-of-way lands.

The two oil companies contested the claims of the carrier's trustee, and the revenues from the wells drilled along its line were impounded pending settlement of the issue.

The Supreme Court held that the bankruptcy court did not exceed its powers in authorizing the trustee to protect all interests, so far as it appeared possible to do so, by preserving the oil from waste and depletion, through its extraction and sale with the net proceeds to be impounded until final determination of the controversy over title to the right-of-way lands.

It did, however, order that the question of fee simple ownership of the right-of-way should be submitted to the Illinois state courts.

BIG OIL COMPANY....

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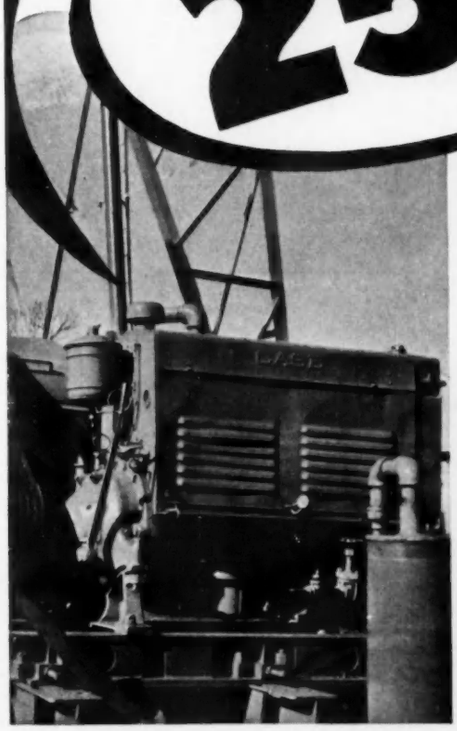

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CASE OIL FIELD ENGINES

North Texas

Sale of record-depth producer looms as lease activity spreads

Wichita Falls.—Sale of the northwestern Montague County record-depth oil producer completed March 20 by W. Bland Omohundro et al to a major company with the supporting block of 1200 acres will be the next development in the aggressive lease activity that has swept across Clay, Montague and Wise counties, including portions of Jack, Parker and Tarrant counties. The latter four counties are late participants, and interest arose from growing belief that the Lower Pennsylvanian and Ordovician series may be productive in the Fort Worth Syncline, although exceedingly deep for the district. The most isolated wildcat projected as a result of the spectacular lease play involves drilling of a 6000-foot test west of Fort Worth near the Tarrant-Parker County line in what is known as the Marys Creek community by Ed. S. Hill et al.

Humble Oil & Refining Company is the most probable buyer of Omohundro et al's producer on the Seay land, 3½ miles south of Ringgold. Others have checked the block and also carried on purchase negotiations. Meanwhile, the well remains shut in after officially gauging 240 barrels of 47.8-gravity oil in 3 hours through equivalent of a ¾-inch bottom hole choke on tubing. Production is from conglomerate at 5693-5704 feet in the Bend section, topped at 5654 feet. It is the deepest oil producer in the district.

Deep lime exploratory tests in the district accounted for an unusually large quota of unfavorable developments, particularly in Archer and Clay counties. The Mankins pool, only attractive Bend lime area in Archer County, provided its first disappointment when Roeser & Pendleton, Inc.'s J. R. Parkey 1, C NW SW H&TC Section 11, Block 3, 1650 feet north of production, filled 700 feet with salt water when unloaded at 4917 feet, with 7-inch cemented at 4888 feet. It will plug off water, and perforate casing opposite oil saturation logged at 4754-66 feet and at 4780-90 feet in Bend, topped at 4750 feet. This outpost encountered a sharp structural dip. British-American Oil Producing Company's T. B. Wilson 1-C, south of the pool discovery, failed to make a producer in Ellenberger section at 5233-5425 feet, with 7-inch at 5218 feet. It is the first to drill to the Ordovician in the pool, and has plugged back to complete in the 4800-foot Bend saturation. Hedrick Oil Company et al's McCrory-Wilson 1, SWc Lot 2, Section 94, 2½ miles southeast of the Mankins area, yielded 500 feet of salt water in 23 minutes when tester was used in Bend at 4790-4810 feet. An oil producer was anticipated, as favorable oil saturation and porosity was noted in samples at 4790-4810 feet. Nominal shows were recorded at intervals in the Strawn. Another test for the area is deemed warranted. Continental Oil Company's Wilson-McCrory 1, east of the Hull-Silk field, was abandoned at 5250 feet, having failed to make a producer in the Bend, topped at 5144 feet, and also from the Strawn in plugging back by stages.

McCarty Test Deepening

Deep Rock Oil Corporation's J. H. McCarty 1, NWc Section 21, Chas. C. Brown Survey, 6 miles east by north of Megargel, was drilling at 5255 feet with Ellenberger as its objective. Bend was at 4862 feet, but no saturation was encountered. Walter Gant et al's Vogtsberger 1, northeastern Archer County wildcat, was drilling at 2700 feet on a 6000-foot contract. It is a short distance northeast of Fain-McGaha and Humble Oil & Refining Company's Fuller 1, abandoned at 5159 feet in June, 1938, after showing for a small well at 5109-36 feet, possibly in the Bend.

Bridwell Oil Company's Halsell 3-A, ¼ mile northeast of production in the Halsell 3-well pool, western Clay County, yielded oil and salt water from saturated Strawn at 4736-71 feet. It occupies a favorable structural position in correlating the top of pay and total depth with earlier completions by the company. This is the first adverse development experienced in the area.

W. B. Omohundro & E. C. Harlin, Jr.'s Kempner 1, near Lake Wichita, southern Wichita County, failed to make a producer in the Strawn series, and was drilling at 5040 feet. In eastern Baylor County, Hall-Jordan Oil Company's Green 1, SE SE Section 8, HT&B and J. E. Hix Survey A-1376, near a 4304-foot failure drilled by British-American Oil Producing Company, cemented 7-inch pipe on top of Canyon at 3061 feet. The earlier test showed small volume of oil with water when plugged back and acidized through perforations at 3059-80 feet. It is 3½ miles southeast of the Seymour 2600-foot Canyon oil pool.

Seek Nocona Extension

Expansion of the Nocona deep pool, Montague County, a mile west by north of Bend production, is being sought by William Payne et al's Baker 1, which was drilling at 3990 feet. Ranger lime marker was called at 1850 feet, 17 feet higher on structure than Stanolind Oil & Gas Company's Zachary 2, one of the nearest active tests.

The Ellenberger failed to produce when tested by two wells on the south flank of the field. Anderson-Prichard Oil Corporation et al's Burnett 1, southeast outpost, was showing for a producer in conglomerate at 5266-78 feet in Bend series, topped at 5238 feet. Top of Ellenberger was logged at 5410 feet. Sunray Oil Company and Ramsey Petroleum Company's Burnett 2 was awaiting completion gauge through perforations at 5293-99 feet in Bend, topped at 5207 feet, after plugging off Ellenberger at 5393-5412 feet. Youngblood & Foree's Hillcrest 1, most easterly producer, pumped 70 barrels oil with little water coming from leaky plug in 13 hours. Production is from lower Strawn at 4665-80 feet. This outpost found water at 5330-42 feet in Bend, topped at 5305 feet, and did not explore the Ellenberger.

Sinclair Prairie Oil Company's Doty 1, west offset to its Bend pay discovery at Bonita, eastern Montague County, was drilling at 3750 feet, and Howard 2, southeast of the producer, was drilling at 950 feet. Other nearby lease owners are to start development if these tests register credible production upon completion. In the Bowers pool, United Producers Company and Continental Oil Company's Langford 2, southwest outpost, was abandoned in solid granite at 3834 feet. The partnership has started Julia Rex 1, near southeast edge of production.

West Texas

Ector County test has gas in Lower Permian, deepening

Midland.—The northwestern Ector County wildcat of M. A. Grisham et al on the Cowden Ranch, C NE NE T&P Section 4, Block 45, moved into the spotlight in developing a gas show in Lower Permian lime at 5660-5710 feet, with nominal porosity and oil odor in drilling at 5727 feet. Originally projected to the Holt pay, which was absent although top of Clear Fork is tentatively placed at 5200 feet, this wildcat may continue to the Ordovician. Richmond Drilling Company and Tom Hunter's University Atlantic 1, Andrews County wildcat 4 miles north of the Grisham test, also missed the Holt pay and was ordered plugged at 5401 feet.

Expansion of Ector County fields is doing much toward maintaining the county's leadership for the district in drilling. The Texas Company's Holt 1 moved production north in flowing 261 barrels oil in 16 hours through tubing choke after nitro shot at 4330-4430 feet. Rhodes et al's Johnson-Sinco 1, previously listed as a ¾-mile southeast extension, swabbed and flowed 123 barrels in 12 hours at 4182 feet while awaiting acid treatment. Each will draw three offsets.

South extensions to Foster field, which has been merged with the Small Johnson and South Cowden, or Addis pools within the past few months, are to be sought. Sun Oil Company and Great Western Producers, Inc., are starting offsets ½ mile south of the original Foster field, while Forest Development Corporation's Moss 1, C NE NE T&P Section 37, Block 43, is a mile east of the Addis Sector near a 4702-foot failure drilled by Humble Oil & Refining Company in 1934.

Seminole field, Gaines County, was enlarged to the southeast by Magnolia Petroleum Company and Atlantic Refining Company's H & J 2-195, rated at 551 barrels initial through ½-inch choke after acidizing pay at 5080-5242 feet. Osage Drilling Company's Crain-Shell 1, northeast outpost, deepened from 5320 feet to 5356 feet, with an elevation of 3410 feet, resulting in a substantial oil increase without water.

The lower pay has been acidized for a retest. Humble Oil & Refining Company's Auten 1, northwest outpost that tested water when acidizing broken pay at 5270-5360 feet, has been abandoned. The latter sidestepped another forced offset on the northwest edge by farming out the SW¼ Section 267 to F. A. Stacey et al for an immediate test and ⅛ over-riding royalty. Production rights below 5500 feet were retained.

Wasomes Oil Company, Midland, became one of the largest lease owners in the Dune field, eastern Crane County, through acquisition of all holdings of Standard Oil Company of Texas for an unnamed cash consideration and $100,000 payable from ½ of net production. When the purchase price and development costs are amortized, the latter company will receive a sliding-scale over-riding royalty ranging from ⅛ of the production of wells that produce above 20 barrels daily to 1/32 for wells that yield less than 10 barrels daily. The deal involves full interest in 1440 acres, with 3 small pumpers in the 3300-foot lime, and a 320-acre lease with a well that was previously held jointly by the two companies. Gulf Oil Corporation is moving in materials to drill Waddell 31, NW SE NW PSL Section 5, Block B-24, midway along the 4-mile interval that separates the Dune and Gulf - Waddell areas.

Failure of Gulf Oil Corporation et al's Tubb 1-A, southeast edge location for the Sand Hills field, Crane County, to make an oil well in drilling through the regular pay to 4618 feet will result in deepening to the Ordovician. Formation tester used at 4200-4316 feet yielded 3,140,000 feet of dry gas, while a second test at 4398-4618 feet was void of oil or gas. Bottom-hole pressure is 2525 pounds.

Humble Oil & Refining Company's Young 1, northern Pecos County wildcat, was drilling at 6185 feet in Simpson, topped at 5624 feet. This test logged a 439-foot section of detrital formation. In the Shipley area, Ward County, Gulf Oil Corporation's Wristen 5 was drilling at 6140 feet in Pennsylvanian. Merry Bros. & Perini, Inc., and Kenneth Slack's Hayes 1, wildcat in the Quito area, logged top of Delaware at 5003 feet, with an elevation of 2740 feet, and halted temporarily at 5019 feet. It is higher structurally than previous tests in the general area.

Todd Ranch deep test opens Basal Pennsylvanian oil area

San Angelo, Texas.—The fourth deep test for the Todd ranch structure, Crockett County, established a new high gravity sweet oil area in the south portion of the Permian basin from a horizon that has not heretofore figured prominently as an oil source for the district. Continental Oil Company et al's J. S. Todd 2-B, near C NE SW GC&SF Section 29, Block WX, flowed natural on March 24 at rate of 2800 barrels daily with 1,275,000 cubic feet of gas from Basal Pennsylvanian series, with the hole bottomed in Simpson shale at 5691½ feet. It is on a unitized block of 4480 acres. Production from the Ellenberger lime, which normally should be 200 feet below the discovery pay, is quite probable as two of the earlier tests almost made producers from this Ordovician member.

The initial performance of the deep well rates it among the largest discoveries in West Texas. It flowed 130 barrels of 40.6-gravity oil the first hour and averaged 100 barrels hourly the next two hours. Gauge was taken through 2-inch outlet on casing as bottom-hole choke on tubing was clogged. The obstruction was removed the next day, and the well flowed 87 barrels oil on one-hour test through ¼-inch choke. Production has since remained shut in while awaiting a market outlet. This will involve building a 12-mile line to the World-Powell field to tie into Humble Pipe Line Company's system, or a 9-mile line to The Texas-New Mexico Pipe Line Company's booster station near Ozona.

First oil saturation was logged at 5615 feet, and the main pay was placed at 5634-90 feet by samples and electric log. Crinoidal lime, reliable marker in the Strawn section of the Pennsylvanian, was called at 5590 feet, with an elevation of 2475 feet. Simpson shale was entered at 5690 feet, and penetrated 1½ feet. Temperature reading at 5637 feet was 118 degrees Fahrenheit.

The Todd ranch has been looked upon with favor as an Ordovician prospect since the advent of deep production at Big Lake field, Reagan County, in 1928. Surface geology was worked in 1925 by Marland Oil Company. First gas production was found the following year near the 1600-foot level, and this same horizon was proved for small oil production in 1933 by Continental Oil Company. Shallow explorations have been conducted at intervals for more than a decade, mostly to forestall lease expirations in anticipation of deep production. In excess of $1,000,000 has been expended within the past 9 years for leases, rentals, royalty interests and deep drilling in the area. The initial try for Ordovician production was launched in 1932 by Stanolind Oil & Gas Company et al after unitizing 100 40-acre tracts, involving an expenditure of $300,000 cash for lease and royalty interests. This first test was contracted to 7500 feet, with contractor receiving $12 per foot. However, the hole was carried to 8041 feet and abandoned in March, 1933, after unsuccessfully plugging back and acidizing oil saturation in the Ellenberger. Superior Oil Company of California formed a new unit of 5760 acres and completed a 7948-foot failure, 1½ miles southeast of the first try, in August, 1937. Continental Oil Company took the initiative in forming a 4480-acre unit of which it holds 61.58 percent, and spotted Todd 1-B, 1½ miles southwest of the first Ordovician project. This third test was abandoned at 7010 feet last January after checking abnormally high on the deep lime beds, with favorable saturation present in the Ellenberger. Todd 2-B was started December 31 to forestall lease expiration, and is 4500 feet northwest of Todd 1-B. A producer was considered assured when top of Crinoidal lime was found 328 feet higher on structure than the previous failure, and top of Simpson 1479 feet higher than the lowest of the quartet. The accompanying table lists the important markers. The Crinoidal was absent in the test by Superior et al.

Geological Markers of Four Todd Ranch Deep Tests

COMPANY	Elevation	Top Lime	Top Crinoidal	Top Simpson	Top Ellenberger	Total Depth
Continental, et al's Todd 1-B	2507	1200	5950	6040	6256	7010
Todd 2-B	2475	1180	5590	5690	....	5691½
Stanolind et al's Todd 1	2660	1435	6990	7060	7250	8041
Superior et al's Todd 1	2537	1170	*	7131	7424	7948

* Crinoidal absent.

Production from the Basal Pennsylvanian prevails to the east in the Page area, Schleicher County, where a single oil well and 3 gas-distillate wells have been completed. It also yields gas and distillate from a few of the Ordovician wells in the Big Lake field.

Continuous development of the Todd ranch area will follow. Continental Oil Company et al have awarded contract for drilling an east offset, observing 40-acre spacing. Pete N. Wiggins, Jr., et al own lease on acreage immediately west and north of the discovery site and a development contract is pending.

Potter County wildcat cases off water; to deepen

Amarillo.—Canadian River Gas Company's City of Amarillo 1, Potter County wildcat near the north edge of Amarillo, encountered salt water at 4261 feet, with an elevation of 3551 feet, and halted at 4268 feet. The hole filled 2000 feet with water, which will be cased off to try for deep production. Small show of oil and gas at 3750 feet did not warrant testing.

Indian Territory Illuminating Oil Company's Bryant 1, C NW T&NO Section 369, Block 1-T, Sherman County wildcat scheduled to drill to 6000 feet to try for Ordovician production, was drilling at 3132 feet. Protection string of 9⅝-inch pipe was cemented at 3052 feet. It is 2½ miles northwest of a gas discovery made by the company in 1938 from broken pay at 2810-3116 feet.

North Cowden allowable boosted

The Texas Railroad Commission has amended its statewide order, effective April 1, by increasing the allowable for North Cowden field 3000 barrels daily, bringing the field allowable to approximately 13,243 barrels a day.

Texas permits

The Texas Railroad Commission last week approved permits for drilling 86 wells, 14 less than were allowed a week ago.

Operators in the East Texas field were permitted to drill three tests, including two in Gregg and one in Rusk County. Six locations were reported from the remainder of the East Central Texas territory.

Fifteen permits were granted in West Central Texas, while six locations were listed from the West Texas District. Gulf Coast operators were permitted to drill six new wells, while the South-

west Texas District led the state with 23 locations, including 12 in Zapata County.

Panhandle operators reported seven locations, and 20 permits were approved in North Texas.

Texas commission schedules three hearings April 1

The Texas Railroad Commission has scheduled a hearing for April 1, at Austin, to determine whether Plymouth Oil Company should be permitted to continue repressuring operations in the Plymouth field, San Patricio County, and whether allowables for injection wells should be distributed among other wells on the same lease.

On the same day a hearing will be held to consider a higher allowable for the South Cotton Lake field, Chambers County.

Separate from the Cotton Lake hearing, but scheduled immediately following, is a hearing to determine whether F. A. Gillespie & Sons should be charged with all oil produced on the F. A. Lawrence "B" lease in the South Cotton Lake field.

East Texas

Deep test in Mexia area has show in Pettit

Tyler.—Peyton et al's Harris 1, the sixth try for Lower Trinity production within and adjacent to the Mexia field, logged first porosity in the Pettit at 5549 feet, and a second zone at 5611-5617 feet. It was drilling at 5670 feet, and will proceed to the 5900-foot level before running pipe for production test. The Mexia faulted structure has been rated as a deep pay prospect since the original deep test blew in making gas with oil spray in 1927 at 5732 feet. A junked hole occurred, and none of the later tests found the pay.

Shell Oil Company's Dorsey 1, Percilla area, Houston County, was ordered plugged, having failed to develop production in testing probable pay zones passed up in drilling to 10,900 feet. It set a new depth record for the Woodbine belt.

W. P. Vaughn & L. A. Rankin's Mary Chapman 1, Hopkins County wildcat near Tira, halted operations after encountering water in Paluxy at 3939-77 feet.

Gulf Oil Corporation strengthened its lease position around the Camp County Lower Trinity prospect that is awaiting production test by acquiring William McGlothlin's interest in about 1000 acres of close-in tracts. The deal involves a substantial cash bonus and an over-riding royalty. Four attorneys are curing titles on acreage within the drilling block owned by Harry Moss and Delta Drilling Company. A production test of the partnership's Joe Venters 1, 2½ miles southeast of Leesburg, will be delayed until title defects are eliminated. The test logged an aggregate of about 50 feet of oil saturation in drilling to 8087 feet during the first week in March. Operations were halted after cementing pipe at 8085 feet. It is generally believed to have entered the Travis Peak at 7830 feet, although qualified geologists have placed the top at 7948 feet. No Pettit section was recognized.

Southwest Texas

San Patricio County wildcat testing 6600-foot sand

Corpus Christi.—Texas Gulf Producing Company et al cored an oil and gas sand at 6657-72 feet in San Antonio Loan and Trust Company 1, 3 miles southwest of Sinton, San Patricio County, and was testing. At 6662-72 feet it recovered 30 feet of distillate-cut mud and developed 500 pounds pressure through ¼-inch chokes in 7 minutes. A second drill stem test was run from 6667½-72 feet, and recovered 120 feet of fluid, 50 percent distillate and the remainder mud with a cut of distillate and a show of slightly brackish water. It developed 340 pounds pressure through ¼-inch chokes, top and bottom, in 15 minutes. Another core was cut to 6677 feet, and a third test was scheduled. The wildcat is in the eastern end of an 80-acre lease in the McAuley Survey, in the general vicinity of an old well drilled by the Stanolind Oil & Gas Company on the Alamo Iron Works lease in Lot 17, Fitzsimmons Survey. The latter test found oil and gas shows in a 6600-foot sand, but was abandoned at 6676 feet.

Fred M. Wood et al's C. E. Hart 1, W. C. Burgess Survey, a mile north of Odem in San Patricio County was swabbed in and built up 1250 pounds shut-in pressure. Opened, it flowed 48 barrels of oil, mud and wash water in 4 hours through 12/64-inch choke. It again was shut in. During the test, the pressures dropped to 200 and 250 pounds on tubing and casing, respectively.

Barnsdall Oil Corporation and Transwestern Oil Company may open a new producing level for the Fagan field in a ½-mile west extension. P. H. Fagan 2, Nicholas Fagan Survey, drilled to 6155 feet, and on basis of electric log and sidewall cores set casing to test a sand at 6068-73 feet.

R. N. Ranger et al's W. Wilson 1, Garcia Survey, 5½ miles southwest of West Ranch in Calhoun County, has been abandoned at 6525 feet. It encountered several sands with oil and gas showings, but none sufficient to make a commercial producer.

After flowing considerable oil and some salt water from perforations at 4828-31 feet, Henshaw Brothers were reworking Maggie McNeill 1 at Wade City, Jim Wells County. The test is attempting to establish a second and shallower oil sand in the pool.

Sun-Kelsey area being expanded by wildcats

McAllen.—Continued wildcatting in the Sun-Kelsey area is further expanding this already large Starr County reserve. Sun Oil Companv's E. Rodriguez 1, 5 miles northwest of Sun pool and 8 miles southwest of Kelsey field in the Santa Teresa grant, was below 7075 feet, reportedly running casing for a series of tests through perforations. Some indications are that it may be carried to 7500 feet before such tests are made. The test has found a number of sands in the Frio, Vicksburg, Jackson and lower zones, several of which appear to have sufficient kick to make commercial producers. It is not likely that it will prove an extension to either of the pools, but may open an entirely new pool in the group.

Eight miles southwest of the field, a gas sand at 3298-3312 feet made Sun Oil Company's Lehr 1, Section 513, look promising. It was making hole below 4175 feet, nearing the first field oil levels. Royal Oil & Gas Company recently widened the Kelsey field nearly one mile to the west with a distillate producer in the regular field sand.

The Sun field proper is expanding in development. Drilling had been confined to the Sun Oil Company for months, but now Humble Oil & Refining Company and Magnolia Petroleum Company are in the field with a drilling program.

To fulfill foreign contracts, W. R. Davis & Company's drilling campaign in the Rincon field is being stepped up. The company has been intensively coring to determine location of sand lenses. This information now seems to be well correlated, and work may proceed more rapidly.

Distillate well indicated from Carrizo zone, Bee County

San Antonio.—First production in the Carrizo zone in South Texas appears to be nearer as a series of tests are conducted in Anderson-Prichard Oil Corporation and Mills Bennett Production Company's D. E. Robinson 2, at West Tuleta in Bee County. The test promises a distillate producer in the 7500-foot horizon. It has been perforated at 7540-55 feet, and on a 2-hour drill-stem test it flowed gas and sprayed distillate under 1750 pounds working pressure. Chokes of ¼-inch, top and bottom, were used. The well was allowed to flow and salt water broke in and finally increased to a near-solid flow. Test was shut in for orders. Some indications are that the water is from perforations, others from a plug set below these perforations. During the earlier tests, the wildcat was rated at about 4 barrels an hour.

Robinson 2 had been carried to 9200 feet. While a sand and shale section at 9110-9200 feet was being tested, tool stuck in the hole. It was backed off, hole plugged to 7900 feet, and a test made at 7806-7969 feet. At this level, the well developed 575 pounds working pressure and recovered 7700 feet of water. It flowed mud at the end of the first hour of the test, then continued to flow muddy water during the remaining 2½ hours the tool was opened. The water was slightly brackish. It then was plugged back to 7600 feet, perforated at 7560-7600 feet. On a 7-minute drill-stem test, pressures were built up to 1000 pounds and the well flowed some gas with a distillate odor. A small amount of distillate-cut mud was recovered.

The test is of significance as it is nearest to production in the Wilcox play along the South Texas trend. It encountered the big sand body of the

Carrizo zone, and found gas and distillate in the upper 85 feet. Below this there apparently is nothing but salt water in the sand section, giving little hope of crude production in this zone on the Tuleta structure. It, however, is expected to bring further exploration for the immediate trend.

Another wildcat along the Wilcox trend was testing. The Atlantic Refining Company's Pearl Conwell 1, Lockhart Survey, 1½ miles west of Thomaston, DeWitt County. It had been drilled to 8519 feet, had stuck drill stem which twisted off, plugged back to 8291 feet and set casing. It was tested through perforations at 8275-85 feet, flowing salt water. Plugged back and perforated at 8240-50 feet, it again flowed salt water and again was plugged back. A third set of perforations were made, but no details are available.

Bunte Brothers et al's Earnest 2, Survey 17, 6 miles northwest of Skidmore, Bee County, was abandoned at 9956 feet. It was plugged back, and drill-stem test made at 5835-47 feet; recovered 1650 feet of brackish water under 115 pounds pressure in one hour.

Union Producing Company's Ray 56, at Pettus in Bee County, was below 8200 feet. In Live Oak County, E. M. Jones' George West 1-A, just northwest of George West, was coring at 9215 feet. Sinclair Prairie Oil Company's Callaghan 1, northeastern Webb County, was at 6350 feet.

Ask unrestricted production for Premont field, Jim Wells

Operators in the Premont field, Jim Wells County, have requested they be allowed to produce whatever oil they can in an effort to salvage production from the field. At a hearing before the Texas Railroad Commission last week, evidence was presented to show that production from the field consists of an emulsion consisting of 96 percent water and 4 percent oil. Efforts to treat the oil have met with little success, and operators are using pits because other methods have proven inadequate and uneconomical.

Approximately $150,000 has been expended in attempting to find the best method for treating the oil, and engineers familiar with the situation said no other field in Texas was producing under similar conditions. The field has an allowable of about 412 barrels per day, and if the request for unrestricted flow is permitted, some 200 barrels more might be produced.

Ask modification of casing rule at Angleton field

Humble Oil & Refining Company has requested revision of the casing program in the Angleton field, Brazoria County, to permit use of only two strings of casing. Engineers for the company told the Texas Railroad Commission at a hearing last week that approximately $16,000 could be saved on each well.

Rules now require 900 feet of surface casing cemented to the surface, an intermediate string 6900 feet long, and a third string to serve as production casing. The program submitted would call for 3000 feet of surface casing cemented 700 feet above the shoe, and an oil string.

Texas Gulf Coast

Wharton County Wilcox sand prospect continues testing

Houston.—Strake Petroleum Corporation continued testing Poole 1, Lissie area, Wharton County, in the Wilcox formation. Operators perforated casing with 170 shots at 9928-51 feet, and hole was washed for one hour. It started to flow wash water with a slight show of gas, and later made brackish water with a slight show of oil through ¼-inch choke. Casing pressure was 1000 pounds. A week ago during a test at 9956 feet it headed 27-gravity oil before it started making salt water.

On the Double Gum Bayou prospect in Liberty County, Titantic Oil Company, Hilary Hebert and Sidney Smith's Boyt 1 was shut down for orders. Operators may plug back for tests up the hole, or may continue to test at the present level. The wildcat, which may open a new Gulf Coast oil field, flowed oil and mud through ⅛- and 7/64-inch choke. Oil tested 35.5 gravity. Tubing pressure was 950 pounds and casing pressure 1090 pounds. The flow was killed, hole acidized, and swab run to 2100 feet. It atempted to blow out at 8845 feet, and 17-pound mud was pumped into the hole. When the wildcat started cleaning itself on a test, it flowed 9.7 pound mud.

Humble Oil & Refining Company had three 10,000-foot tests at Anchor field, Brazoria County, which looked disappointing last week. They showed salt water. Carr 1 was waiting on cement at 10,847 feet after a squeeze job. It had been perforated at 10,695-701 feet with 10 shots and it came in flowing 4 barrels of fluid per hour, 7 percent oil and 93 percent salt water, through ¼-inch choke. Tubing pressure was 525 pounds and casing pressure 1200 pounds. Crocett 1, southeast side of the field, was drilled to 10,615 feet, perforated with 10 shots at 10,045-050 feet, and flowed salt water through ⅜-inch choke. It was plugged back to 9840 feet where a test will be made. Galzink & Taylor 1, northeast of the discovery, was waiting on cement at 10,496 feet after a squeeze job. Tests at 10,695 feet showed water, hole was plugged back, and tests at 10,491 feet did not look encouraging. Glenn H. McCarthy's Neidringhaus 1, 2 miles southwest of the discovery was down to 10,577 feet in shale. Side wall cores were being taken, but so far have failed to show anything of commercial importance.

Glenn H. McCarthy completed Salmon et al 1, 2200 feet northwest of the discovery at Anchor, Brazoria County, gauging 115 barrels of distillate daily through ¼-inch choke with tubing pressure of 1750 pounds. Completion was in Frio sands at 9808-24 feet. It had been drilled to 10,756 feet and plugged back.

To Sidetrack

Southwest ¼-mile of the discovery at Chocolate Bayou, Brazoria County, Glenn H. McCarthy's Andrau 1 was preparing to sidetrack at around 11,468 feet after failing to recover fish lost in the bottom of the hole. It had shows of oil below 11,000 feet and may open the first 11,000-foot production in Texas. Houston Farms Development Company 2 was drilling at 11,520 feet in shale.

Strake Petroleum Corporation's Phelan 1, 3300 feet east of distillate production at North Cheek, Jefferson County, was circulating at the end of the week. The outpost attempted to blow out and heavy drilling mud was being pumped into the hole.

On the Highland prospect in Harris County, Thompson Drilling Company has located Highland Farms Development Company No. 1 in the J. White Survey. This is a geophysical prospect, and General Crude Oil Company and Gulf Oil Corporation are the major lease holders in the area.

The old Spurger gas field of Tyler County has been made an oil field by completion of Republic Production Company's Sterne 1, over 2 miles northwest of Joe's Lake field. The old bottom was at 4694 feet, and the well was reworked and plugged back to 4689 feet. A drill stem test at 4685-4704 feet showed oil, mud and salt water. Seven-inch casing was set at 4685 feet, and on a 1½-hour gauge made an estimated 400 barrels of pipe line oil daily through ¼-inch choke from the Cockfield formation. Tubing pressure was 425 pounds, and shut in pressure was 700 pounds.

Output at Old Ocean

About 4300 feet southeast of production at Old Ocean, Brazoria County, Stanolind Oil & Gas Company located Stevenson-Donovan 1 in the center of a 40-acre tract in the I. Kemp Survey. It will be drilled to 10,500 feet or deeper.

Magnolia Petroleum Company abandoed Swanson 1, El Campo area, E. T. R. R. Survey, Wharton County, at 6598 feet. It failed to log oil sands in the Frio. On East Bay prospect, Galveston County, Sun Oil Company abandoned State 1-178 at 8210 feet. No oil shows were reported.

Gulf Oil Corporation's second test on the northwest side of Fannett field, Jefferson County, to be completed in the new deep sand is Bordages 3, 640 feet southwest of the discovery. It flowed 847 barrels of pipe line oil daily through ¼-inch choke with tubing and casing pressure of 1450 pounds, bottomed at 8245 feet.

On the southeast side of Anahuac field, Chambers County, Humble Oil & Refining Company completed Broussard Hebert 18 at 7229 feet in the deep sand. It flowed 682 barrels of pipe line oil daily through ¼-inch choke.

Wade City hearing April 8

A hearing to fix operating rules for the Wade City field, Jim Wells County, has been scheduled by the Texas Railroad Commission for April 8 at Austin.

E. R. TURNER, vice president and general manager of Pan American Production Company, Houston, is in New York on business.

Louisiana Gulf Coast

Five new fields result from record drilling program

Lake Charles.—Drilling activity in the Louisiana Gulf Coast is at a peak never before reached in its history March has been a banner month for the area. Five new oil fields were discovered, two wildcats indicated late last week that they may bring total to seven and several wildcats have shown oil or gas. A number of semi-wildcats have extended fields and found new oil sands around the flanks of old domes.

Drilling activity is up 65 percent over the same period in 1939. So far this year there have been 216 wells completed, as compared to 131 completions at this time last year. Footage drilled during the first quarter of 1940 has increased 88 percent over the first 3 months of 1939, 1,365,727 feet drilled so far this year and 726,758 feet the first part of last year. There are over 140 active drilling wells in the Louisiana Gulf Coast.

The district's fifth new oil field, all opened during the past two weeks, is Continental Oil Company's Niblett 1, at Nibletts Farm, Jefferson Davis Parish. The wildcat tested at 11,604-624 feet and came in flowing 12 barrels of 42-gravity pipe line oil per hour through 3/16-inch choke with a tubing pressure of 700 pounds. Hole is bottomed at 11,748 feet, and 990 feet of 5-inch liner was set at bottom. Seven-inch casing was set at 10,995 feet. This wildcat opens the deepest producing area in Jefferson Davis Parish.

The Texas Company's State 1, 16s-7e, St. Mary Parish, opened a new field when it came in flowing 25 barrels of 23.2-gravity oil and 1,000,000 cubic feet of gas daily through 11/64-inch choke after casing had been perforated at 3109-3136 feet. This wildcat was drilled to 8685 feet in shale and casing set on bottom. Shows of oil were reported at 3109-37 feet and at 3141-60 feet. This is the company's first new oil field for 1940 in this district.

One of the major strikes this year, if not the most important, is Atlantic Refining Company's discovery at Neale, Beauregard Parish. Whitmer 1, Section 26-3s-11w, opened the first Wilcox production this year and the third for the trend. The wildcat was perforated at 8357-69 feet and flowed 18 barrels of 35.5-gravity (corrected) oil per hour through 3/16-inch choke with tubing pressure of 800 pounds. Prior to the production test, a drill-stem test resulted in a flow of 15 barrels per hour with tubing pressure of 600 pounds. Closed-in pressure was 825 pounds. A drill-stem test of the deeper Wilcox sand at 8412 feet showed salt water and a little oil. This is Atlantic Refining Company's second strike in the Louisiana Gulf Coast, the first being at North Tepetate, Acadia Parish.

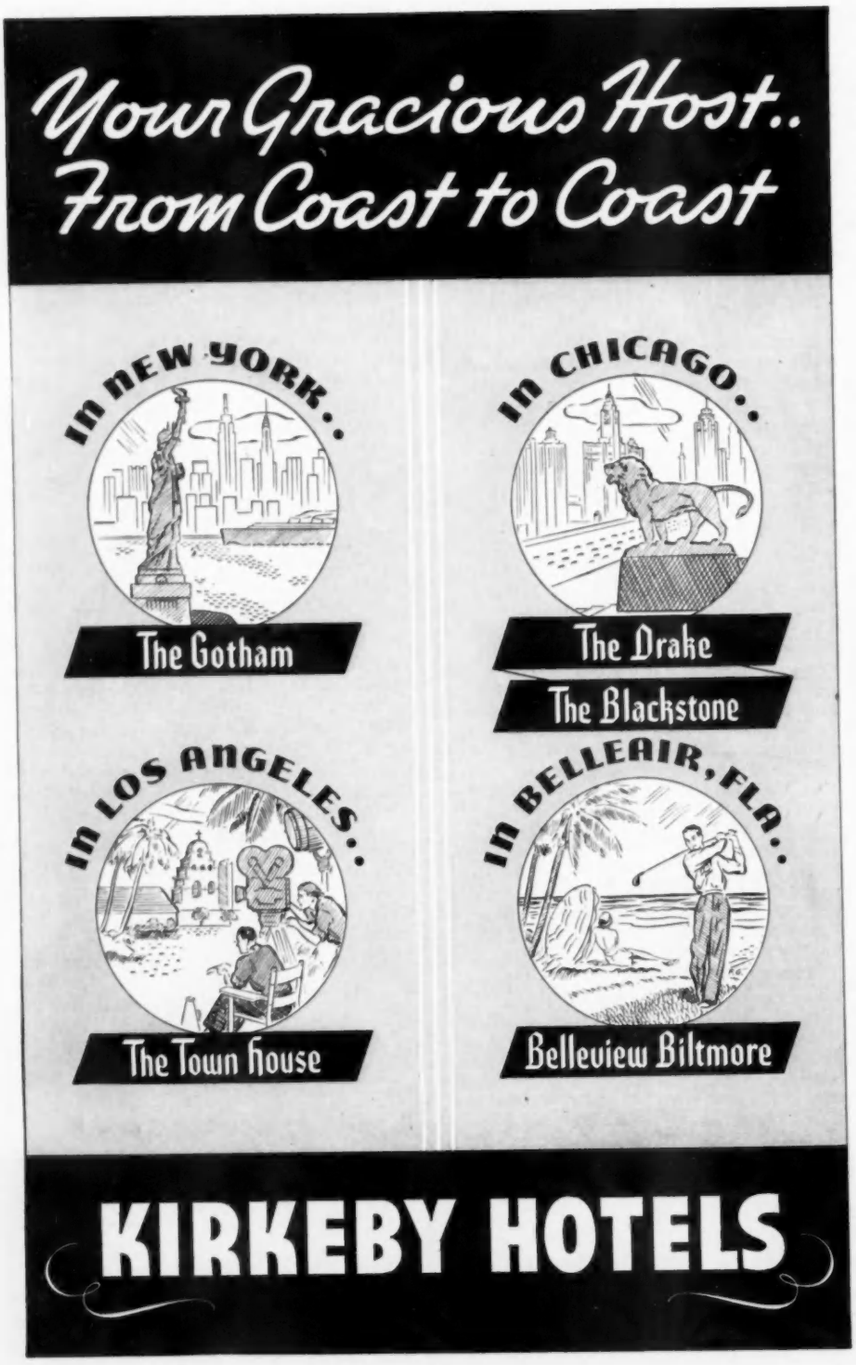
Delta Farms on Potential

The district's first field of the year, opened by Tide Water Associated Oil Company's Delta Farms 1, Delta Farms area, Lafourche Parish, flowed 212 barrels daily, 7 hours through ⅛-inch choke and 17 hours through 5/32-inch choke, during potential test. Tubing pressure was 1175 pounds and the gas/oil ratio was 990/1. On a 23-hour gauge, the well flowed 234 barrels through 3/16-inch and ¼-inch chokes. For 3 hours through ¼-inch choke, it flowed 18 barrels per hour with tubing pressure of 850 pounds. It was perforated at 11,290-305 feet.

Plymouth Oil Company's McHugh Heirs 1, discovery at Bayou Pegion, Iberia Parish, cleaned itself and was flowing 8½ barrels of 35.6-gravity oil daily through 7/64-inch choke with tubing pressure of 800 pounds. This wildcat was completed at 8052 feet. It opens the company's first oil field in the district, and was drilled on farm-out acreage of Shell Oil Company.

Vincent & Welsh's Ruppert 1, Richie area, east of Tepetate, Acadia Parish, indicates that it may open the sixth new oil field for the district. The wildcat was flowing 65 percent 24-gravity oil and 35 percent basic sediment and water through perforations at 3505-15 feet.

One of the most closely-watched wildcats in South Louisiana was The Texas Company's Vermilion Parish School Board 1, on the Erath prospect, Vermilion Parish. It is bottomed at 11,762 feet in a sidetracked hole, and 2200 feet of 5-inch liner has been set to 11,493 feet. Operators plan to test from 11,393 feet up the hole. The wildcat is



reported to have logged around 350 feet of gas and distillate sands.

West China Coring Shale

Union Sulphur Company's Samson 1 on the West China prospect, Jefferson Davis Parish, was coring in shale at 8197 feet. This wildcat logged a broken sand with a show of oil at 7449-59 feet. A 12-minute drill-stem test made through ¼-inch chokes showed a slight blow, 2 stands of mud cut with oil, and 8 stands of salt water.

On the flank of Napoleonville, Assumption Parish, Falcon Seaboard Oil Company may open a new producing area in Sinoneaux 1, Section 43-12s-13e. The wildcat was drilling in shale below 4650 feet after running an electric log which showed gas sands at 3090-3125 feet. The hole will be carried deeper, and if no additional sands are found the gas sand probably will be tested.

Drilling activity will probably be increased at Port Barre field, St. Landry Parish, with completion of The Texas Company's Botney Bay 27. The semi-wildcat is one-half-mile south of production, and two dry holes lie between the new well and proven production. Botney Bay 27 was drilled to 6513 feet, and when plugged back discovered a new producing horizon, deepest for the field. It was perforated at 6050-93 feet and it came in flowing 336 barrels of 37.9 gravity pipe-line oil daily through 12/64-inch choke. The outpost also had other new sands showing oil.

New Sand at West Hackberry

Stanolind Oil & Gas Company opened a new oil sand on the north flank of West Hackberry field, Cameron Parish, with completion of Cameron Parish School Board 21. The well was perforated with 150 shots at 9290-9315 feet and flowed oil and wash water into the burning pits, ungauged. Tubing pressure was 1175 pounds and casing pressure 1200 pounds. This is the deepest producing sand found at West Hackberry.

At Sweet Lake, Cameron Parish, Pure Oil Company completed Yount Lee 15 in the deep sand after perforating casing with 70 shots at 7160-75 feet. It flowed 445 barrels of 36-gravity oil daily through ¼-inch choke. Tubing pressure was 780 pounds and casing pressure 750 pounds.

Superior Oil Company will drill another wildcat on the flank of Calcasieu Lake dome in Cameron Parish; State 2 is in Section 1-14s-9w.

The Texas Company was preparing to test a new sand, the shallowest in the field, at Lafitte 15, Section 20-17s 24e, which was drilled below 10,000 feet. Tests in the regular producing horizons showed oil and salt water. It was plugged back and casing perforated with 40 shots at 6515-95 feet for a test. There have been no wells completed at Lafitte above 9000 feet, although several wells have cored oil sands from around 5800 feet down.

Mikton Oil Company was preparing to make another test on its second well at Lafourche Crossing, Lafourche Parish. Martinez 2, 1650 feet southeast of the discovery, was testing a new oil sand at 10,110-120 feet. Other sands tested around 10,030 feet showed salt water, gas and a little oil.

It is reported that Dallas Petroleum Company purchased the Canal and Lincoln Oil Company's properties in the Leeville field. Lafourche Parish, for approximately $175,000, to be paid out of oil. This did not include production below 5000 feet.

New Sand at Paradis

The Texas Company opened another new producing horizon at Paradis, St. Charles Parish, in L. L. E. Paradis 3, Section 8-14s-20e. Test was drilled to 11,555 feet, plugged back to 10,220 feet, and casing was perforated with 40 shots at 10,187-212 feet. It flowed 958 barrels of 37-gravity oil daily through ¼-inch choke. Tubing pressure was 1750 pounds. The deepest producing horizon at Paradis is at 10,340 feet.

Shell Oil Company opened a new gas and distillate sand at West Lake Verrett, St. Martin Parish, when a test on Jeanerette Lumber Company 4, perforated at 11,348-353 feet, flowed 38 barrels through a 10/64-inch choke during the first 12 hours, and during the next 12 hours made 76 barrels. Fluid was 10 percent salt water and 90 percent 46.9-gravity oil. Tubing pressure was 4000 pounds. Operators will probably rework the well, as the tubing was leaking. Jeanerette Lumber Company 4 logged other new sands up the hole. West Lake Verrett is producing from around 8000 feet.

On the flank of Choctaw, West Baton Rouge Parish, Standard Oil Company of Louisiana's Morley Cypress 2 logged several new sands for the area. It was coring below 8580 feet in shale after coring oil and gas sands at 8525-33 feet. It also had oil sands at 8035-60 feet.

North Louisiana

Shallow Wilcox sand field opened by LaSalle Parish test

Shreveport.—A new shallow oil field for North Louisiana adjacent to the Angelina-Caldwell Flexure was indicated last week with successful completion of H. L. Hunt's Louisiana Central Lumber Company 9, NE NE 13-10n-2e, LaSalle Parish, flowing 18 barrels of 30.4-gravity oil per hour through 7/32-inch tubing choke after casing was perforated at 2269-76 feet in what was identified as the Wilcox. The well had been drilled to 2993 feet, showing salt water with only a little oil and 750,000 cubic feet of gas daily at the lower level. It was plugged back and completed at the 2200-foot level, production being entirely free of salt water. Casing pressure was 220 pounds, and tubing pressure 200 pounds.

The wildcat is 5 miles east of the shallow Urania field, discovered in 1925 and which produces from the Claiborne-Wilcox contact at 1500-1600 feet. Its completion is expected to set off new exploration for shallow oil pools along the Angelina-Caldwell Flexure that separates the Sabine and Monroe Uplifts and the North Louisiana embayment from the Gulf Coast area, along the upper part of which are the Conroe and Eola trends.

The new producer is ½ mile west of Hunt and Arkansas Fuel Oil Company's Goodpine 1, NW NW 18-10n-3e, drilled to 8997 feet and recently plugged back

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to 4863 feet at which point 5½-inch casing was cemented. Operators are now preparing to perforate this hole and test shallow horizons.

The long-awaited deep test for the shallow Haynesville field, Claiborne Parish, was announced last week in a contemplated 10,000-foot test by Ohio Oil Company and Gulf Refining Company at G. W. Taylor 1, SE SE 15-23n-8w. Materials were being moved in. This test climaxes 3 years of geophysical exploration and leasing in and around this shallow field, discovered in 1921 and producing from the Blossom (Ozan) horizon at 2800 feet. The shallow horizon, which has produced over 70 million barrels of 35-gravity oil, has been repressured, the first project of this kind ever attempted in North Louisiana. The structure is a tilted dome.

Set temporary rules for new Arkansas field

A temporary rule calling for 20-acre spacing and a 100-barrel allowable per well was entered by the Arkansas Oil & Gas Commission last week for the prospective new Fouke field of Miller County. The rule was entered on the suggestion of engineers for Standard Oil Company of Louisiana, and the commission declared a hearing would be held at Texarkana to establish permanent rules for the field when five producers are completed.

A 40-acre spacing rule and 200-barrel allowable for wells in the Smackover lime and Glen Rose formations were also ordered by the commission.

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In another order, Standard Oil Company of Louisiana was given authority to pipe 2,000,000 cubic feet of gas daily from the Big Creek gas field of Columbia County to the Buckner field for repressuring. Engineers estimate about 100 gallons of distillate will be obtained daily in the operation.

To take bottom-hole tests at Dorcheat, Arkansas

The seven operators in the Dorcheat (Experiment) field, Columbia County, Arkansas, asked the Arkansas Oil & Gas Commission that the field be shut in from April 21 to May 1 for bottom-hole pressure tests to determine allowables. The request was granted. This is a Smackover lime field, producing from the 8800-foot level, deepest in Arkansas.

Arkansas permits

Three drilling permits were issued last week by the Arkansas Oil & Gas Commission, as follows: Franklin County—Ozark Natural Gas Company's J. S. Turner 1, C SE NE 32-10-26; Lafayette County — Atlantic Refining Company's Bodcaw Lumber Company 1, C NE SW 29-17-23; Union County—Barnsdall Oil Company's North Central Texas Company 1, 327 feet east and 272 feet south NWc NW 5-18-14.

Louisiana permits

Twenty-three drilling permits were issued last week by the Louisiana Conservation Commission, of which 7 were for North Louisiana divided among the following parishes: Caddo, 5; Concordia, 1; and Sabine, 1. Those in South Louisiana were in the following parishes: Beauregard, 1; Calcasieu, 2; Cameron, 2; East Baton Rouge, 1; Jefferson Davis, 1; LaFourche, 7; Plaquemines, 1; and Rapides, 1.

Mississippi

Five wildcats started, two dry, as activity increases

Jackson.—Increased wildcat activity took place last week in Mississippi, the scene of extensive geophysical exploration and leasing since discovery of oil last August at Tinsley Dome field, Yazoo County. Locations were made for 5 wildcat tests, and several others are planned for immediate drilling. Two wildcats were abandoned.

In Stone County, South Mississippi, Harry I. Morgan and S. P. Borden, of Shreveport, erected derrick for a 7000-foot test, L. N. Dantzler Lumber Company 1, NE SE 8-4s-12w. Gulf Refining Company, which leased extensively in this part of South Mississippi and drilled several 7000-foot holes, including one in this county, after discovery of the Jackson gas field, is said to have an interest in the new test.

In Holmes County, North Mississippi, where several large drilling blocks have been assembled since Tinsley Dome was discovered, Allied Pipe Line Company (Hawkins & Matthews) spudded Ellis 1, C NE SW 18-14n-4e, on a 10,000-acre block. J. C. Hawkins, Tyler, Texas, has the contract.

Three wildcat locations were made in Humphreys County. B. J. Crawford and B. A. Hollandale will drill in NE NE 1-13n-14w; Fohs Oil Company will drill Holaday 1, C SW SW 5-13n-5w; and Showers & Moncrief will drill State 1, NEc 9-15n-2w, a 6000-foot test on a 10,000-acre block including considerable state-owned land. Exchange Oil Company is expected to drill soon on a block in 16n-1e, Holmes County. In the same county, Varner Company is planing to drill in SW NW 27-15n-1e, 6 miles west of Lexington.

Robert P. Lake, Tyler, Texas, abandoned a Yazoo County wildcat, Mrs. R. L. Exum 1, NEc 13-11n-2e, in shale at 5327 feet. With elevation of 221 feet, it topped Midway black shale at 3247 feet, and Midway chalk at 4110 feet. In Issaquena County, Germany, Lucy & Fair abandoned Mohanna 1, C NE 13-18n-3e, in a salt water sand in the Tuscaloosa (Woodbine) at 6024 feet.

Alabama Activity Up

Activity in Alabama is also increasing. Union Producing Company has taken over and will deepen to 10,000 feet the late Joe Modisett's McCorvey 1, NE SE 20-9n-2w, drilled to 7520 feet, deepest test ever drilled in Alabama. Several major companies had lease spreads in Modisett's 30,000-acre block. This test was drilled from February to November, 1937. Drilling was halted in red and gray shale with streaks of lime in the lower Cretaceous. Electric logs were run to 4614 feet and to 7520 feet. Top of chalk was 1865 feet, 135 feet higher than a test drilled in Section 13-9n-3w, and 212 feet higher than one drilled in Section 15-9n-2w. Location of present test is thought to be about the crest of the Hatchetigbee Anticline.

Georgia Resources, Inc., with Oklahoma associates, made location for another test in Clinch County, Georgia, Wilkinson 1, in Land Lot 273, Land District No. 12, two miles north and a mile west of Georgia Resources, Inc.'s Gillican 1, which after setting 10-inch casing at 756 feet had to sidetrack. The company has over 75,000 acres under lease in this block, which is near Homerville.

Michigan

Barry County wildcat has 800 feet oil from Traverse

Mt. Pleasant. — Fox & Fleming's Lechlentner 1, SE SE NE 27-2n-9w, Hope Township, Barry County, carried 800 feet of oil from Traverse lime at 1820 feet, where it had been bottomed for test, and was the best encouragement for an oil field in Barry County to date. The semi-wildcat is a mile east of N. A. Trexler's Bagley 1, Section 27, Hope Township, which made a well of dubious commercial status early this year in the Traverse formation. Bagley 1 has not been pumped for several weeks, but was rated a 2- to 5-barrel well after acid shot on completion.

First follow-up completion in Holland Township, Ottawa County, where Crown Development Company completed a 125-barrel natural Traverse wildcat in February, was a failure. Twin Drilling Company's Hyma 1, Section 34-5n-15w, three locations west

and one location north of the discovery, bottomed dry at 1603 feet, and appeared to kill any immediate possibility of a field extending into the Holland City townsite. Lot leasing had been active.

The Basin was void of interest except C. L. Maguire, Inc.'s Clark 1, Section 32-16n-2w, Warren Township, Midland County, where an oil-gas show was logged in the Monroe lime at 4544 feet. Monroe was topped at 3960 feet. A number of wells are producing from this horizon in Tuscola County, and one is producing from this zone in Bay County. Maguire planned to carry the test to the Sylvania sand. At 4663 feet drilling line broke and further deepening was delayed for a fishing job. The show logged at 4544 feet did not appear to have commercial importance.

Wildcatting is comparatively quiet even though Michigan's reserve position is none to good and available daily production is not meeting the full demand of buyers. In the monthly production estimate of the Oil & Gas Association of Michigan, February runs were reported at 64,667 barrels a day, or a total of 1,875,355 barrels, which was 167,016 barrels under January.

There are 15 active wildcats now drilling in southwestern Michigan, and 18 active wildcats in the Basin and other scattered areas.

Seaboard Oil Company plans to carry Hodges 1, Section 22-5n-10w, Caledonia Township, Kent County, through the Monroe and possibly into the Sylvania. Traverse was topped at 1882 feet with an oil show at 1929 feet. Hole is to be reamed from 1884 to 1960 feet to reset 5-inch before deepening.

Shelbow Oil Company has resumed drilling Van Lente 1, Section 35-4s-19w, Berrien County, at 2543 feet after a shutdown of several weeks. It topped Trenton at 1935 feet, and probably will be carried into the St. Peters.

Rocky Mountain States

LaBarge field extended two miles by 50-barrel well

Casper, Wyo.—Wyoming had its second strike of 1940 when North LaBarge Oil Company made a substantial extension to the LaBarge oil field, opening a considerable shallow area for further testing and development. Government 1, SWc NE SE 8-27n-113w, completed for 50 barrels of light oil daily with 8¼-inch production string set on top of the contact sand at 1973 feet in the Almy beds of Tertiary origin lying unconformably on the Cretaceous rocks. The well is 2 miles northwest of nearest production on the LaBarge fold, and marks the company's second extension within a six-month period. Late last September the company made a ¼-mile north extension in the LaBarge field proper.

The LaBarge field pipe line-rail outlet to Opal has recently been linked by a spur pipe line to Utah Oil Refining Company's crude oil carrier across Wyoming to Salt Lake City. Because of this outlet, a steady drilling campaign in the North LaBarge area is expected. The LaBarge field, actively producing since 1929, has had a remarkable record, producing 5,833,699 barrels from 106 wells with the field showing scarcely more than 1 percent decline through the 10-year period.

General Petroleum Corporation's Government 1-21, CNW NW NW 21-35n-77w, third test of the Cole Creek field, Natrona County, central Wyoming, cored into the top of saturated Lakota sand at 8005 feet. It checks closely with the company's Government 1, ¼ mile to the southeast, producing from the Dakota-Lakota sands. The 7-inch production casing is set at 8002 feet.

The Lance Creek field, Niobrara County, Wyoming, was defined on the north by The Ohio Oil Company's Agness Rohlff 6, SE NW NE 32-36n-65w, ¼ mile beyond production, drilled to 5739 feet and dry in both the Joss and Leo sands. The company's State-Lamb 8, NWc NW NW 36-36n-65w, east extension test of the East Lance Creek high, was drilling below 3175 feet, and will shortly be at critical depth in first objective, the Sundance series.

The United States Geological Survey recently published a map and report of the East Lance Creek oil and gas field. The geology is by William B. Kramer and C. E. Dobbin, assisted by Robert McMillan. The separately designated high on the Lance Creek structure was surveyed September 11 to 25, 1937, and May 16 to June 24, 1939.

Probably the last well to drill on the involved oil placer lands in the East Lance Creek area until the title dispute is settled is Continental Oil Company's Apex 5 OPC-1, NE SW NE 34-36n-65w, which was installing pumping equipment at 4158 feet. It is understood the well will be suspended without production test. The company's Apex 6 OPC-4, SW NW NW 38-36n-65w, is a dropped location following federal suit to disclaim locators and assigns to the acreage. Some 31 claims embracing 2500 acres are under fire in the suit, and it will stymie activity in the east sector of the field until the litigation is settled. Discovered 3 years ago with a Sundance deep extension test and coming into an active drilling campaign a year ago, some 45 wells were scheduled for drilling in this area of the field. It is estimated that approximately 250 oil workers will be thrown out of work by the government's action seeking to disclaim locators after a 22-year lapse since claims were filed.

The Sinclair-Wyoming Oil Company has prospects of a better-than-average completion for its Sundance drilling program in the Lost Soldier field, Sweetwater County, southwestern Wyoming. Lost Soldier 91-A, SEc SE NE 10-26n-90w, swabbed 130 barrels in the first 8 hours from 2080 feet. The company's Lost Soldier 92-A, NE NW SW 11-26n-90w, drilling with light rotary, was making hole below 1403 feet.

Northern Montana had a sharp upturn in activity last week as Spring arrived with good drilling weather. Seven wells were spotted in northern Montana fields, 6 in Kevin-Sunburst and one in Cut Bank. None were extension tests.

California

Fresno County wildcat to test Cretaceous

Los Angeles.—Most interesting California wildcat venture is Jergins Oil Company's Cheney Ranch 1, Section 29-14-13, Mendota area, Fresno County. This location is 30 miles north and slightly west of Coalinga field. Scout reports credit it as a test of the Cretaceous. Its importance hinges on its possible bearing on other San Joaquin Valley fields where the Eocene is the oldest producing formation.

The test is understood to be bottomed at 7581 feet, and a water shut-off was obtained on 8⅝-inch casing set at 6700 feet. Several possible productive sands reportedly were cored in the Cretaceous but late reports are only a slight showing of gas which tends to discount hopes. Successful completion would lend importance to the possibility that similar producing sands might be found to occur below present Eocene production at Coalinga Nose, Kettleman Hills, North Dome and other Valley fields.

Richfield Oil Corporation is coring KCL 72-33, outpost test in Section 33-30-25, Coles Levee area of Kern County, below 9300 feet. A formation test at 9047-9166 feet resulted in a flow estimated at 2400 barrels a day of 30-gravity oil and 2,500,000 cubic feet of gas. In this area, Shell Oil Company's KCL B-81, Section 17-31-25, outpost, is drilling in shale and sandstone at 10,387 feet with no showings of importance yet encountered.

Union Oil Company was preparing to complete Kernco 56-27, Section 27-28-25, Rio Bravo field, a mile north of its discovery. With 7-inch casing set at 11,298 feet, test cored into oil sand to 11,500 feet, electric log was run, and the test prepared for completion.

Top of the Rio Bravo was cored at 13,310 feet, but actual top was believed to be near 13,305 feet.

The Texas Company cored top of the Eocene in S. P. 1, wildcat test in the Cantua Creek area of Fresno County, Section 23-17-15, at 8775 feet. Well is reported coring in what is believed to be the lower Eocene at 9580 feet in sand and shale. No showings of importance have been reported.

Tide Water Associated Oil Company was preparing to complete Porter 12, deep test in the Aliso Canyon area, Section 27-3-16. When testing for a water shut-off, the test demonstrated a flow of 13,000,000 cubic feet of gas and 300 barrels daily 50-gravity condensate from open hole between 6910 feet to top of plug at 7550 feet.

In the Newhall area in this district, British American Oil Producing Company's Edwina 1, Section 14-4-16, has been cored to 4316 feet in shale reported to show oil cuts. Operators believe project is only a short distance above the Eocene. Geology is described as surface anticline with theoretical shoreline accumulation.

Shell Oil Company successfully completed KCL A-72-30, north outpost project in the Ten Sections field, which flowed on potential test 3078 barrels daily, clean oil and 1,865,000 cubic feet of gas. Test was bottomed at 8200 feet.

UNITED STATES WELL COMPLETIONS

Arkansas

Company, Well and Location	Init. Prod. Bbls.	Depth
Little River County (Wildcat)—		
Clark et al, Strawn 1, 17-10-32....	*	1810
Columbia County (Magnolia)—		
Atlantic Ref. Co., Gunnels 1, 19-17-19	450	7575
Miller County—(Rodessa)—		
Skelly Oil Co., Wallis 1, 7-20-27...	120	5130

California

Company, Well and Location	Init. Prod. Bbls.	Depth
Los Angeles County (Dominguez)—		
Union, Callender 33	111	6790
Los Angeles County (Long Beach)—		
Woolner Oil Corp., Fee 1	90	5203
Los Angeles County (West Montebello)—		
Herley-Kelley Oil Oper. Burke Com. 3	136	7297
Kern Oil Co., Monterey 38	504	7680
Mabee and J. E. Co., Mulholland 6	96	7670
Los Anegeles County (Rosecrans-Athens)—		
St. Anthony Oil Corp. Gordon 1...	158	7927
Los Angeles County (Wilmington)—		
Continental Corp., L.A.C.F.C.D. 1..	672	2932
General Pet. Corp., Patton 1	112	3611
Long Beach Oil Dev. Co., "Z" 8..	120	4132
L. A. Basin Dri. Co., Kupfer 8....	220	3554
Union Pacific RR Co., U.P.P.D. 5..	562	2755
Kern County (McKittrick)—		
Mid-State Oil Co., Welport 1	50	1217
Fresno County (Coalinga Northeast)—		
Amerada Petroleum Corp. S.P. 28-17B	3515	8168
Bandini Petroleum Co. 46-18B	177	9614
Standard, 71-19B	1186	8259
Union, Cook 68-18B	480	8285
Kern County (Kern River)—		
Dick & Dore Co. 19	4	425
Dick & Dore Oil Co. 23	5	646
Ventura County (Sespe)—		
English, Lankershim 2	108	2812
Santa Barbara County (Santa Maria Valley)		
Cole, Paderewski 3	250	5614
Ventura County (Rincon)—		
C. C. M. O. Co., Hobson B-30	492	5250

Illinois

Company, Well and Location	Init. Prod. Bbls.	Depth
Clinton County—		
F. Osborne et al, Kaelin 1, sw c se 12-1n-1w	602	2929
Scott-Cary Oil Co., Quick 1, lot 13 blk 4 12-1n-1w	1000	2914
S.W.S. Oil Co., Noll 1, lot 9 blk 5 12-1n-1w	720	2917
Taylor Dr. Co., Baker 1, se sw se se 12-1n-1w	726	2907
J. B. Barnes, Klein 1, s½ blk 8 13-1n-1w	144	2902
Etheridge, Brown 1, ne sw se ne 13-1n-1w	145	2912
Hughes, Pfoff 1, blk 2 13-1n-1w..	227	2898
Hughes Pet., Peiffer 1, blk 3, Western Addn 13-1n-1w	262	2912
E. C. Lane, Hutner 1, n½ blk 6 Western Addn 13-1n-1w	56	2905
Oil Prod. Co., Garke 1, lot 5 blk 1 13-1n-1w	432	2913
Stewart Oil Co., Daum 1, lot 3 B 13-1n-1w	147	2906
Morris et al, Gummersheimer 1, c w½ sw nw nw 31-1n-10w	*	852
Fayette County—		
Texas, McKee 5, 79 ft e of c n½ of nw nw 7-6n-3e	77	1584
Ohio, Schwarm 9, c of e 1 se nw nw 31-6n-3e	51	1626
W. C. McBride, Logue 1, sw se sw nw 8-7n-3e	37	1498
Carter, Welker 11, sw ne ne 18-7n-3e	84	1571
Shell, Jedamski 7, c ne ne sw 21-7n-3e	10	1582
Texas, Wanland 3, nw nw se 31-7n-3e	112	1588
Carter, Algood 1, se ne nw 2-8n-3e	220	1533
Hamilton County—		
Texas, Provident Mutual 1, n½ nw nw 21-3s-7e	*	3427
Jasper County—		
Pure, Warren Consol. 1, c e½ ne nw 33-6n-10e	348	2847
Jefferson County—		
Alma, Copple 1, se se nw 9-1s-2e..	105	1923
Ray 1, ne ne sw 9-1s-2e	26	1918
Marion County—		
B. Fields, M&I RR 8, lot 3 blk 85 18-1n-1e	212	2912
Hawley Oil Corp., Storer 2, lot 2 blk 41 18-1n-1e	800	2908
W. F. Lacey, Fee 2, lot 2 blk 84 18-1n-1e	240	2910
Lain O&G Co., Centralia Coal Co. 1, sw nw se sw 18-1n-1e	200	2904
Texas, Freidrich 10, ne se sw 6-1n-2e	840	1872
Johnson 13, nw sw se 6-1n-2e....	1620	1871
Murray 1, ne nw sw 7-1n-2e	210	2095
Davis 1, nw ne ne 21-1n-2e	*	2655
W. R. Curry, Young Strip 9, sw ne se se 20-2n-2e	96	3416
D&H Dr. Co., Young Strip 2, nw se se se 20-2n-2e	290	3433
Magnolia, Young 85, nw ne ne se 20-2n-2e	92	3452
Young 33, se se sw se 20-2n-2e..	105	3427
Ohio, Young Hrs. 39, sw ne sw 20-2n-2e	1838	3461
Texas, Young 29, sw se se ne 20-2n-2e	105	3435
Chapman 19, ne se nw sw 28-2n-2e	1757	3450
Lee 25, sw c sw 28-2n-2e	2597	3425
Ohio, Young 20, nw ne ne nw 29-2n-2e	1056	3426
Young Hrs. 35, sw ne se nw 29-2n-2e	2400	3435
Texas, Fossieck 15, nw ne ne sw 29-2n-2e	4340	3415
Freidrich 26, ne nw sw 29-2n-2e.	1855	3415
Freidrich 27, ne nw sw sw 29-2n-2e	2240	3400
McCollum 25, 50 ft s of sw se se 29-2n-2e	1260	3438
Shanafelt 16, ne nw ne ne 29-2n-2e	266	3419
Shanafelt 17, nw ne ne ne 29-2n-2e	490	3425
Shanafelt 18, nw ne ne ne 29-2n-2e	681	3425
Branch 5, se se se 32-2n-2e	4599	3468
Farthing 10, ne nw ne 32-2n-2e..	6145	3460
Hays 8, sw ne nw nw 32-2n-2e..	2464	3355
McCollum 24, ne se nw ne 32-2n-2e	10,871	3409
Miller 11, nw ne se 32-2n-2e....	3878	3470
Wiser Oil, Weems 11, se sw nw nw 33-2n-2e	2315	3468
Richland County—		
Pure, Kropp 1, se nw se se 6-4n-10e	69	2755
Grove 1, c w½ sw ne 31-5n-10e..	217	2875
Shelby County—		
Seaboard et al, Miller 1, sw sw se 32-11n-2e	*	3080
Wabash County—		
Central States Oil Co., Baines 1, nw ne se 5-1n-13w	*	2787
Mode et al, Keneitt 1, se sw sw se 19-1s-12w	40	2400
Mabee Dr. Co., Bump 5, c ne nw nw 9-2s-13w	192	2448
Continental, LeGier 2, se nw se 17-2s-13w	167	1765
Delta Dr. Co., Gray 1, sw sw sw 29-2s-13w	38	2477
Wayne County—		
Pure, Behymer 1, c e½ ne se 33-2n-8e	98	3126
I. W. Humphreys, Wagner 1, se ne sw sw 27-1s-7e	120	3335

Summary of Drilling Operations in the United States, Week Ending March 30, 1940

	WELLS COMPLETED						*PERMITS FOR NEW WELLS					
	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total 1940	Total this Date 1939	This Week	Total this Month	Total 1940	Total this Date 1939	Year Total 1939
Alabama	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	3	2	.....	1	570	47	59	3	16	32	48	223
California	23	21	.....	2	9,048	316	263	54	96	258	256	1,174
Colorado	.....	.....	.....	.....	.....	2	6	.....	.....	.....	.....	.....
Florida	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Georgia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois*	68	62	.....	6	63,773	876	978	68	277	963	.....	893
Indiana	11	8	.....	3	739	97	27	.....	.....	.....	.....	.....
Kansas	22	19	2	1	25,765	378	299	35	157	427	316	1,583
Kentucky	6	4	.....	2	413	58	160	.....	.....	.....	.....	.....
Louisiana	38	28	1	9	8,875	376	242	23	149	359	280	1,444
Michigan	14	8	.....	6	1,372	329	289	19	92	318	261	1,419
Mississippi	3	1	.....	2	480	39	1	.....	.....	.....	.....	.....
Missouri	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....
Montana	4	2	.....	2	391	32	25	.....	.....	.....	.....	.....
Nebraska	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico*	9	9	.....	.....	2,585	188	164	7	55	192	.....	293
New York	20†	20†	.....	.....	93	282†	126†	.....	.....	.....	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	6†	4†	1	1	11	219†	206†	.....	.....	.....	.....	.....
Oklahoma	32	15	2	15	3,047	509	478	35	174	494	484	2,059
Pennsylvania	38†	34†	3	1	40	647†	299†	.....	.....	.....	.....	.....
South Dakota	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Tennessee	2	1	.....	1	8	2	.....	.....	.....	.....	.....	.....
Texas	177	135	3	39	86,213	2,624	2,515	86	805	2,741	2,721	10,269
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	6	1	4	1	5	154	132	.....	.....	84	58	718
Wyoming	3	3	.....	.....	3,532	39	45	.....	.....	.....	.....	.....
Total this week.	485	377	16	92	206,960	7,268	6,315	330	1,821	5,915	4,424	20,075
Total last week.	578	416	27	134	229,470	6,784	5,899	367	1,562	5,585	4,009	.....
Total this year.	7,268	5,310	438	1,530	2,810,728	.....	.....	.....	.....	.....	.....	.....

* This tabulation includes those states where weekly data are available; figures for Illinois date from October 15, 1939; New Mexico from August 1, 1939.
† Includes water-input wells.

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Snyder, Vaughn 3, nw ne nw 35-2s-8e	165	3392
Texas, Heaton 3, c e½ nw ne 17-3s-7e	*	3400
White County—		
Kingwood, Bailey 1, se ne nw 25-6s-8e	481	2519
W. C. McBride, Inc., Johnson 2, ne nw ne 25-6s-8e	792	2526

Indiana

Gibson County—		
Fotiades, Fleener 1, se nw se 21-3s-12w	45	2714
Yates 1, se nw ne 29-3s-12w	*	2810
Joe Bander et al, Cooper 30, sw c se se 13-3s-14w	125	2516
Continental, Keck 4, se sw sw 26-3s-14w	119	2517
Keck 5, se se sw 27-3s-14w	70	2801
Martin County—		
Norris et al, Thorp 1, sw c sw 26-3n-4w	*	573
Harrison Dev. So., Lewis 1, ne nw nw se 27-5n-3w	*	1500
Posey County—		
Roberts Bros., Keck 3, c w½ ne nw 34-3s-14w	100	2803
J. S. Roberts, Keck 1, ne nw ne nw 34-3s-14w	51	2789
Jack Wrather Jr., Keck 1, Jr., sw ne ne nw, 34-3s-14w	178	2802
Vigo County—		
Siosi Oil, Strain 1, c e½ se nw 16-10n-10w	50	2134

Kansas

Barton County—		
Aylward et al, Bird 1, c se nw 33-18-15w	27	3510
Stanolind, Thomas 5, csl se ne sw 35-19-11w	197	3306
Texas, Petz 1, c n½ ne se 7-20-11w	3000	3316
Gulf, Howard 2 c n½ nw sw 8-20-11w	3000	3306
Butler County—		
Rex et al, DeMoss "A" 5, ne se sw 5-28-7e	40	2675
Cowley County—		
Hawkeye et al, Hittle 6, se sw ne 21-31-4e	3798	3297
Ellis County—		
Gulf, Mai 9, c n½ ne se 14-11-17w	48	3367
Dickey, Carmichael "A" 6, c s½ ne nw 18-11-17w	3000	3355
Lario, Roesner 2, s s½ nw sw 11-12-18w	3000	3679
Ellsworth County—		
I. T. I. O. Co., Boye 2, c w½ nw ne 16-16-10w	3000	3372
Stanolind, Schroeder 1, c e½ ne ne 28-16-10w	457	3310
McPherson County—		
Continental, Chavez 4, csl sw nw ne 20-21-1w	189	3345
Pratt County—		
Skelly, Krehbiel "B" 1, cwl sw ne sw 1-28-11w	¶29.4	4223
Rice County—		
Rose et al, Hathaway 2, nw se nw 34-19-10w	102	3307
Meridan, Johnson 4, csl sw nw se 31-20-7w	1193	3320
Rooks County—		
Superior, Johnson "A" 1, swc se 26-10-19w (OTD 3349 ft)	312	3487
Russell County—		
Spencer et al, Atherton 3, c e½ nw ne 30-13-14w	561	3315
Stanolind, Krug "B" 4, c n½ se se 27-14-14w	*	3185
Texas, Gurney 3, c w½ nw ne 23-14-14w	942	3047
Stafford County—		
Stanolind, Seifkes 7, nec se 3-22-12w	2603	3605
Stevens County—		
Stevens O&G Co., Leonard 1, c 3-32-38w	¶20	2630
Sumner County—		
Stelbar, Frankum 8, c s½ nw ne 32-31-1w	295	3692

Kentucky

Daviess County—		
Master Oil Co., Davis 1	10	1235
F. F. Gibson, Harrison 2	15	1077
Steward & Snyder, Westerfield 4	192	1710
Henderson County—		
Sun Oil et al, Unit 3	196	2602
Livingston County—		
J. H. Dunn et al, Dunn 1	*	2504
Ohio County—		
Hunt et al, Russel 2	*	477

South Louisiana

Anse La Butte—		
Glassell & Glassell, Breaux 2	*	5047
Bancroft—		
Republic, Columbia 16	241	7288
Baton Rouge—		
Sugarfield Oil Co., McDonnald 2	25	7220
Wm. Helis, Nelson 8	216	6477
Bay St. Elaine—		
Texas, State 3	*	5720
Charenton—		
Pan American, Veeder 20	149	1255
Darrow—		
Humble, Community 28	324	4649
Eola—		
Amerada, Dent 3	535	8570
Dent 1-A	637	8574
Sid Richardson, Haas 10	621	8576
Golden Meadows—		
Berkshire, Malgon 2	370	2666
Wm. Helis, Gaspard 3	97	2664
Texas, LaTerre Co. 3	1028	10,388
New Iberia—		
Wm. Helis, Bolivar 12	96	1240
North Crowley—		
Humble, Reiners 7	779	8599
Williams 7	746	8801
Port Barre—		
Westgate-Greenland Oil Co., Johnson 1	*	5314
McDannald, Futral 2	260	5403
Ville Platte—		
Continental, Fontenot 2	340	9024
Woodlawn—		
Woodlawn Oil Co., Hebert 1	104	9542
Beauregard Parish—		
Atlantic, Lutcher Moore 1, Singer area, 13-5s-12w	*	10,500
Cameron Parish—		
Superior, State 1, Calcasieu Lake area, 14s-9w	*	2525
Orleans Parish—		
W. T. Burton, L. & N. 1, Unknown Pass area, 18-11s-15e	*	10,405
W. T. Burton, State 2, Lake Pontchartrain area, 10s-13e	*	10,134

North Louisiana

Caddo Parish (Rodessa)—		
F. W. Burford, G. T. Atkins 2, 5-23n-15w	135	6110
Caddo Parish (Pine Island)—		
Duncan & Harrison, Carter 1, 9-21n-16w	25	2382
Galbraith & Mealey, Raines 20, 22-21n-15w	45	1625
L. O. Gandy, Etchison 1, 11-20n-16w	25	1525
J. H. Hooker, Muslow 1, 5-20n-15w	120	1560
Texas Co., La. Co. Fee 6, 1-20n-16w	40	1480
Bossier Parish (Sligo)—		
Triangle Dr. Co., Chatman 1, 18-17n-11w	245	3125
Caldwell Parish (Wildcat)—		
Critchett & Woods, Kyle A-1, 18-11n-3e	Junked	4980
LaSalle Parish (Wildcat)—		
H. L. Hunt, La. Cent. Lbr. Co. 9, 13-10n-2e	336	2993
Union Parish (Monroe)—		
Memphis Nat. Gas. Co., Lankford 1, 10-21n-3e	¶1½	2200
Webster Parish (Cotton Valley)—		
Hassie Hunt, Coyle 2, 22-21n-10w	*	6294
Hunt Oil Co., Gaines 1, 30-21n-9w	420	8671
Hunt Oil Co., Jordan 1, 31-21n-10w	580	8610
Quad Oil Co., Gray 3, 27-21n-10w	336	5678

Michigan

Allegan County—		
Fred Pope, Harnish 1, ne ne sw 18-4n-12w	*	1630
Sprenger Brothers, Schaap 1, ne ne se 33-4n-14w	20	1520
Jacob Bolema, Brower A4, sw sw ne 34-4n-14w	130	1465
W. J. Bernier, Skinner 1, sw sw se 26-3n-16w	*	1346
Isabella County—		
Pure, Embrey B4, ne nw nw 3-14n-6w	400	3613
Kent County—		
Smith & Stroms, Molloy 4, nw sw sw 28-7n-12w	197	1902
C. A. Welsh, Cudahy 4, sw se nw 33-7n-12w	225	1893
C. J. Neal, Heald 1, sw sw ne 8-6n-12w	*	1820
Missaukee County—		
C. W. Teater, Community Lease 1, c se 31-23n-5w	*	1005
Monroe County—		
Fisher & McCall, Inc., Brunt 2 se sw sw 30-6s-6e	25	2152
Montcalm County—		
Gentry Engineering Co., Christensen 2, c n sw ne 29-11n-8w	*	3308
Ottawa County—		
Twin Dr. Co., Hyma 1, ne nw nw, 34-5n-15w	*	1603
E. B. Strom, Tr., Masterson 3, sw ne se 23-7n-13w	300	1878
George Kernodle, Cook 1, se ne ne 23-7n-13w	75	1878

Mississippi

Issaquena County (Wildcat)—		
German, Lucy & Fair, Mohanna 1, 13-18n-3e	*	6024
Yazoo County (Wildcat)—		
Robert P. Lake, Exum 1, 13-11n-2e	*	5327
Yazoo County (Tinsley Dome)—		
Union Producing Co., Gearge Herron 1, 11-10n-3w	480	4543

Montana

Glacier County (Cut Bank Field)—		
Glacier Prod. Co., Maltby 2, cne ne 8-33n-5w	220	2840
Evans 1, csw ne 21-33n-5w	171	2940
Newell & Chandler, Anderson 1, cne nw 1-36n-6w	*	3244
Toole County (Kevin-Sunburst Field)—		
Coolidge & Coolidge, McCurdy 3, se nw sw 2-35n-3w	*	1960

New Mexico

Chaves County—		
Comanche Drl. Co., Sloop-Purcell 4, near nec 15-11s-26e	40	1274
Eddy County—		
Repollo Oil Co., Parke 8-A sec sw 15-17s-30e	25	3430
Underwood & Sanders, Travis 1, nec ne 17-18s-29e	95	2585
Lea County (Eunice)—		
Ohio, State-McDonald 15, nec ne 14-22-36	96	3805
Lea County (Maljamar)—		
R. W. Fair et al, Baish 3-B, c nw ne 27-17s-32e	360	4040
Lea County (Penrose)—		
Gulf, Christmas 4-C, nw sw nw 18-22s-37e	419	3740
Lem Peters & Elder, State-Humble 3-H, sw se se 34-22s-37e	60	3654
Lea County (Vacuum)—		
Humble, State 15-K, c sw se 32-17s-35e	972	4650
Phillips, State-Santa Fe 38, c nw ne 5-18s-35e	518	4642

New York

Allegany County—		
B. & B. Oil Co., Bond farm, Bolivar	6	1365
Penn-York Oil Co., Welch farm, Bolivar	5	1465
E. G. Williams et al, Maddock farm, Bolivar	10	1385
Messer Oil Co., Miles farm, Bolivar	8	1427
Ebenezer Oil Co., Emerson farm, Scio	5	1052
Bradley Prod. Corp., Monitor farm, Alma	5	1358
Monitor farm, Alma	5	1362
Messer Oil Corp., "M", Garrison farm, Alma	8	1461
Wm. McEnroe & O. W. Brown, Bellamy farm, Alma	7	1352
L. H. Thornton et al, Brown farm, Alma	8	1360
Cornwell farm, Willing	5	1227
Moore & Repp, Jordan farm, Wirt	6	1344
A. C. Shaner Oil Co., Childs farm, West Clarksville	5	1252
Hill, Hughes Bros. & Keller, fee farm, Genessee	6	1376
Sawyer & Petra, fee farm, Genesee	4	1315
Water (Intake) Wells—		
Forest Oil Co., Ackerman farm, Bolivar	..	1416
Bradley Prod. Corp., Monitor farm, Alma	..	1340
Otsquago Oil Corp., Pike farm, Alma	..	1476
Quaker Oil Co., Brown farm, Alma	..	1248
Willets & Paul Corp., Lot 22, Genesee	..	1536

Ohio

Licking County—		
C. A. Davis et al, Woodruff 1	¶.12	2165
Medina County—		
Thornton Prod. Co., Sanford & Watson F-7	5	375
Sanford & Watson F-13	5	388
Sanford & Watson O-22	1	396
Noble County—		
Merry & Skinner, Fogle 1	1	520
Kennonsburg O. & G. Co., Hart 1	*	735

"I" indicates water input well.

Oklahoma

Caddo County—		
Stephens, Farwell 3, nw sw sw 27-6n-10w	93	3570
Creek County—		
Chapman, McNac 2, se nw se 35-15n-10e	107	3165

[*Continued on next page*]

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Garfield County—		
Fain Dr. Co. et al, Schnakenberg 1, ne se sw 21-21n-4w	•	6543
Hughes County—		
Manahan, Mullie 1-A, swc ne 23-6n-8e	•	3318
Jackson County—		
Gulf, Boucher 9, ne se sw 32-1n-19w	69	2650
Kerbo et al, Walls 2, se sw nw 11-1n-20w	16	1694
Kiowa County—		
Shell, Hutchen 1, ne nw se 19-7n-17w	540	1293
Lincoln County—		
Wilcox, School Land 12, se sw sw 16-14n-6e	20	3140
Youngblood et al, Wright 1, nec se 32-16n-6e	37	3955
McClain County—		
Simpson-Roodhouse, James 1, sw se se 9-5n-3e	1020	3650
McIntosh County—		
Acme Dr. Co., Reynolds 1, nec sw 22-11n-14e	•	1412
Okfuskee County—		
Summit, Simmer 2, se ne nw sw 18-10n-11e	175	2275
Wells, Powell 1, c nw sw 30-10n-12e	¶3	2150
Champlin, Thompson 2, ne sw nw 7-13n-8e	•	2996
Oklahoma County—		
Kerlyn, College 2, se se nw sw 21-13n-3w	215	6760
Osage County—		
Platter 9, swc nw 30-22n-9e (OTD) 975 ft)	•	1365
Pontotoc County—		
Skelly et al, Metropolitan Life "B" 1, se ne sw 23-2n-7e (OTD 4040 ft)	•	1445
Arrowood, McCool 1, sw ne ne 6-4n-7e	•	1614
Pine, Randall 1, nw sw ne 35-5n-4e	480	2515
Pottawatomie County—		
Moday, O'Connor 1, nw se se 25-6n-4e	•	3380
Alma, Johnson 6, nw sw sw 19-6n-5e	36	2883
Lyday 1, se ne sw 30-6n-5e	•	3979
Burke-Greis, Guinn 1-A, nw sw nw 16-7n-5e	•	3406
Pace, Haer 1, se nw sw 31-10n-5e	•	4313
Seminole County—		
Culver et al, Burton-Swan "A" 2, nwc se 3-5n-5e	•	2801
Deep Rock, Reed 1, nwc se 6-6n-8e (OTD 4243 ft)	•	4420
Clark, Harjo 1, ne se sw 19-7n-8e	20	4164
Pure, Reed 4, ne sw se 14-8n-6e (OTD 4274 ft)	101	4304
Deep Rock, Douglass 4, nw sw nw se 30-8n-8e	135	2920
Tulsa County—		
Reynolds, Tingley 1, ne nec 23-17n-12e	•	1940
King, Samuel 1, se nw ne 35-17n-12e	¶1	719
Wagoner County—		
Gartner Trott, Summer 2, sw nw ne 6-16n-18e	•	920

Pennsylvania

Company, Well and Location	Init. Prod. Bbls.	Depth
Bradford District—		
H. M. Jack, et al, Jack	2	....
Underwood & Moody, Loop	1	....
Pine Run Oil Co., Bing 130-1-2-3-4-6	4	....
J. P. Kervin, fee	½	....
J. H. Brahaney, fee	4	....
Carl J. Hamm, fee	1	....
Penn Valley Crude Oil Corp., fee	2	....
Forest Oil Corp.	1	....
Forest Pet. Corp., 2 wells	2	....
Niagara Oil Corp., 4 wells	4	....
Bradford Transit Co., 12 wells	12	....
Water (Intake) Wells—		
Diffytown Oil Co., Sullivan	..	....
Forest Oil Corp., 2 wells	..	....
Forest Pet. Corp., 3 wells	..	....
Niagara Oil Corp., 3 wells	..	....
Middle District—		
A. E. Kahle et al, Kahle	2	....
M. L. Boyle, Duke	2	....
Water (Intake) Wells—		
Cities Service, Hamilton	..	....
Butler Armstrong District—		
V. F. Leithold et al, Humes	2	....
SOUTHWEST PENNSYLVANIA		
Armstrong County—		
T. W. Phillips G. & O. Co., Boyer 1	•	3600
Equitable Gas Co., Heilman 1	¶.13	3419
Fayette County—		
Duquesne Gas Co., Demaske 3	¶.57	2428
Washington County—		
Shivers et al, Horne 1	¶.30	3554

Tennessee

Company, Well and Location	Init. Prod. Bbls.	Depth
Clay County—		
R. D. Compton, Buford 3, 5 mi ne Celina	•	420
Fentress County—		
Travis Smith et al, Choate 1, 9 mi. w Jamestown	8	1869

East Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Joiner Area—		
Sam Letwin et al, Eaton 7 (7.31-ac)	750	3754
Kilgore Area—		
Magnolia, Griffin 23 (44.6-ac)	240	3605
W. B. Pearce et al, Borders 4, blk 153	500	3659
Longview Area—		
Coastal Dev. Co. (was Va. O&R Co), Flewellen 18 (200-ac)	1500	3668
Wood 5 (100-ac)	1500	3550
L. S. Flannery et al, York 2-A	3600	3552
B. F. Phillips et al, Everett 1, blk 14	600	3652
Grady Vaughn-Magnolia, Collins 9 (45-ac)	4000	3674
Falls County (Wildcat)—		
R. D. Salisbury et al, Shankle 1	•	1274
Franklin County (Talco)—		
Stroube & Stroube, Norman-Prince 6	570	4275
Houston County (Grapeland)—		
Grapeland Oil Co., Horn 1	¶67	5984
Houston County (Navarro Crossing)—		
Humble, Hill 2	62	5884

West Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Andrews County (Means)—		
Humble, Means 76	776	4515
Concho County (Wildcat)—		
Natural Resources, Inc., Armor 1	•	1565
Crane County (Gulf-McElroy)—		
Gulf, McElroy 212	904	2945
Crockett County (World-Powell)—		
F. B. Black et al, Powell 9-B	813	2642
Crockett County (Wildcat)—		
Continental et al, Todd 2-B	2800	5691
Ector County (Foster)—		
Arrow Drl. Co.-York & Harper, Foster 11	1366	4300
Atlantic Ref. Co., Henderson 8	1422	4250
J. D. Bodkins et al, Johnson-Texaco 1	767	4148
Sinclair Prairie, Gist 1	600	4290
Stanolind, Cowden 35-A	464	4200
Johnson 17	116	4260
Witcher 40	1903	4180
Ector County (Goldsmith)—		
Gulf, Goldsmith 260	946	4197
Goldsmith 262	3861	4178
Goldsmith 264	385	4169
Phillips Pet.-Pure, Cowden 82	810	4150
Ector County (Jordan)—		
Atlantic Ref. Co., University 7-D	1086	3655
Ector County (North Cowden)—		
Barnsdall Oil Co., Smith 6	1469	4190
Gaines County (Seminole)—		
Humble, Auten 1	•	5360
Osage Dr. Co., Tippett-Ohio 6-A	856	5327
Gaines County (Wasson)—		
Continental, Moore 5-46	813	5007
Hockley County (Slaughter)—		
Stanolind, Slaughter 7-B	618	5010
Pecos County (Schkade)—		
O. E. Schkade et al, Lehman 1	1	59
Lehman 2	½	70
Lehman 3	½	53
Scurry County (Sharon)—		
F. W. Merrick, Inc., 1st Nat'l Bank (Snyder) 1	127	2539
Scurry County—		
D. M. Buffington & C. R. Smith, Chapman 1-A	40	745
Scurry County (Wildcat)—		
Dennis & White, Winston 1	•	520
Ward County—		
Gulf, Estes 130	928	2686
Navarro Oil Co., Sealy 1	891	3072
Winkler County (Henderson)—		
Atlantic & Emperor, Hess 8-C	1520	3070
Winkler County (Kermit)—		
Gulf, Clapp 30	¶20	2526
Yoakum County (Wasson)—		
Aloco Oil Co., Hill-Walker 4	778	5214
Miller-Texaco 10-A	1662	5155
Willard-Texaco 4-B	1007	5235
Anderson-Prichard Oil Corp., Willard-Spearman 2	1026	5136
Continental, Kendrick 3-868	1700	5110
Honolulu Oil Corp., Wilder 6-804	942	5155
Wilder 8-824	752	5175
Willard 3-761	974	5180
Humble, Bennett 2	582	5215
Mabee O.&G. Co., Willard 3-C	1171	5191
Mid-Continent Pet. Corp., Comer 4	1717	5180
J. W. Murchison et al, Anderson 1-B	357	5225
Oil Development Co. (Tex), Willard 10-803	1678	5215
Willard 12-803	2142	5210

West Central Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Brown County—		
Hamer et al, Howell 4 (key well)	1	1212
Callahan County—		
Bennett & Little, Clinton 1	•	1703
Comanche County—		
L. H. Choate et al, Ayers 4	125	578
Eastland County (Wildcat)—		
Keough et al, Walters 1	•	3514
Jones County—		
Fain-McGaha Oil Corp., Ferguson 4	15	1899
Jones County (Wildcat)—		
C. W. Byron-Grisso Roy. Co., Gray 1	•	3352
Shackelford County—		
Georgian Corp., Balch 16	5	292
Hickok & Harry Reynolds, Nail 4-C, sec 133	•	1750
Roark et al, Hickman 2, sec 16	30	663
Roeser-Pendleton & Continental, Cook 5-A-113	290	1572
Ungren-Frazier & Fortson-Taylor, McCown 5-A	1044	3178

Texas Panhandle

Company, Well and Location	Init. Prod. Bbls.	Depth
Carson County—		
Magnolia, Fee (Tr 244) 73	221	3065
Shell, Cooper 8-C	304	3113
Gray County—		
Magnolia, J. S. Morse 4-B	308	2753
Hutchinson County—		
Clay Bros. Dr. Co., Herring 5-A	¶3.2	3149
Texas, Pond 21	756	3074
Pond 22	875	3056
Moore County—		
Phillips, Spurlock	¶12.6	3190

South Texas

CORPUS CHRISTI DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Bee County—		
Bunte Bros., Earnest 2 (WC) sur 17	•	9956
Calhoun County—		
R. N. Ranger, Wilson 1 (WC) Garcia Gr.	•	6525
Jackson County—		
Coastal Drl Co., Combs 1 (Mauritz)	75	5657
John Coffee & D. C. Norwood, Genthlin 1 (WC) O. S. York Sur	•	6007
Humble, Menefee 1 (1) (West Ranch)	900	5526
Magnolia, Nannie B. West 56-A (West Ranch)	1100	5760
Nannie B. West 58-A (West Ranch)	1100	5129
Jim Wells County—		
V. J. Meyer & V. F. Simons, Shear 3-A (Magnolia City)	¶2.50	5725
Live Oak County—		
Hagan & Stewart Co., Reagan (2) (WC) Michael Hely Sur	•	784
Nueces County—		
Blanco Oil Co. & Buchanan Prod. Co., Gandy C-2 (Minnie Bock)	•	6000
E. A. Graham, Kampenkel 2 (Minnie Bock)	127	3821
Hiawatha O&G Co., A. J. & Annie T. Smith 8-B (Saxet)	¶5.100	10,892
Refugio County—		
Shield Oil Co., Sasse 5 (La Rosa)	500	5413
San Patricio County—		
Commercial Dr Co., Dunn 4 (E. White Point)	500	5674
Homer Easterwood, Rowe 1 (E. White Point)	500	5656
O. W. Killam, Taft Syndicate 10 (E. White Point)	600	5612
G. J. Lee & Alphee Le Blanco, McGinn 1 (E. White Point)	450	5679
L. L. Smith, Nelson 1 (McCampbell)	275	7509
Southern Minerals Corp., Carlock 2 (McCampbell)	350	7180
Texas Atlas Pet. Corp., Richman 1 (McCampbell)	250	7500

LAREDO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Duval County—		
Chas. Andrus et al, Peters 1 (Rancho Solo)	60	1877
W. H. Appell & Marvin Waler, Sutherland 2 (Peters)	•	2421
Continental, Driscoll 47-A (Driscoll)	350	3353
Cox & Hamon & Gorman-Yoakam, Hoffman 4 (109) (Tarancahuas)	250	2054
Cuellar Bros. Cuellar 1-C (Hoffman)	90	2855
Hagan & Stewart, Cuellar Bros. 1 (Hoffman)	150	2816
Humble, D. C. R. C. 6-F (Cedro Hill)	75	1443
Magnolia, Hahal 4 (Government Wells)	•	2943
M. M. Miller & Sons, Miller 20 (Longhorn)	375	4075
Texas Co., D. C. R. C. 37 (190) (Cedro Hill)	125	1452
Jim Hogg County—		
Colorado Octane Co., Martinez (Trevino) A-3 (Colorado)	200	3017
Humble, King Ranch-Colorado 4 (Colorado)	150	3059
Starr County—		
Herbert Aid, Fidel Salina 1 (WC) Por. 72	•	750
W. R. Davis & Co., Slick Est. B-10 (Rincon)	¶250	4232
Humble, McGill Bros. 71 (Kelsey)	300	4743

United States Well Completions—*Continued*

Company, Well and Location	Init. Prod. Bbls.	Depth
Moss, Owen & Bishop, Medardo Hinojosa 4 (N. Ricaby)	35	1681
Sun, McKinney 9 (Sun)	350	4655
Webb County—		
Bridwell Employes Oil Co., Adami A-6 (Adami)	50	995
Humble, Yaeger 5 (Adami)	40	988
Red Bank Oil Co., Adami 7-B (Adami)	58	1003
Adami 8-B (Adami)	166	1002
Zapata County—		
Buffalo Oil Co., Hinnant 31-C (Mirando Valley)	100	1882
Interstate Minerals, Lopez 38 (Mirando Valley)	40	1795
Lopez 39 (Mirando Valley)	40	1732
Lopez 40 (Mirando Valley)	*	1850
Kleiner & Hill, M. Trevino 19 (Escobas)	9	1263
SAN ANTONIO DISTRICT		
Caldwell County—		
Ralph R. Ogden, Talley Est. 4 (Dale)	68	2306
Guadalupe County—		
D. Eickenroht, Oelkers Est. 1 (WC) Sec. 206	*	1103
Travis County—		
Lane & White, Wells Est. 1 (WC) Sur. 42	*	1695

Texas Gulf Coast

Anahuac—		
Humble, Broussard Herbert 18	682	7229
Anchor—		
Glenn H. McCarthy, Salmon et al 1	115	10,756
Batson—		
B. G. Dowell, Milhome 120	18	1429
Cedar Point—		
Standard of Texas, State 61-119	164	4515
Clear Lake—		
Humble, Humble-West Fee C-39	162	5916
Fairbanks—		
Atlantic, Daugherty 1	*	7810
Amerada-Stanolind, Foley 20	128	6843
Fannett—		
Gulf, Bordages 3	847	8245
Hardin—		
Paul Benedum, Humphrey 1	*	7666
Hastings—		
Stanolind, W. R. Curkeet B-38	472	6105
Lochridge—		
Shell, Ramsey B-8	266	6408
Lovall Lake—		
Humble, Oswald 1	*	7600
Jefferson Land 10	182	7785
Rosenberg—		
Humble, Miller 1	*	8530
South China—		
J. K. Hughes, Guiterman 1	*	8011
South Cotton Lake—		
Salt Dome, Casey 1	103	6520
Thompson—		
Humble, Davis 24	522	5410
H. M. Naylor, Musselman 10	*	8360
Galveston County—		
Sun, State 1-178, East Bay area	*	8210
Wharton County—		
Magnolia, Swanson 1, se of El Campo, E. T. R.R. sur	*	6598

North Texas

Archer County (Hull-Silk)—		
Deep Oil Dev. Co.-R. G. Drl. Co., Little 4	1608	4361
Helmerich-Payne-Blackwell O&G Co., Wilson 10	1200	4371
Archer County (K-M-A)—		
W. H. Hammon-Hanlon & Buchanan, Ferguson 9-B	530	3920
Archer County—		
Rancho Oil Co., Prideaux 16	7	658
Archer County (Wildcats)—		
L. T. Burns et al, Munchrath 1	*	1137
Continental, Wilson-McCrory 1-A-20	*	5250
Clay County—		
E. N. Costley et al, McInness 1-B, blk 58	184	1082
Clay County (Wildcats)—		
D. A. Kahn, tr. Fultz 1, blk 56	*	1370
T. A. Norwood et al, Parker 1, blk 128	*	1708
Staley Oil Co., Phariss 1, blk 49	*	1469
Cooke County (Walnut Bend)—		
Ed Cox & Hamon, K. Neu-Texaco 5-A	606	4983
Cooke County—		
C. & L. Oil Co., Perkins 14	11	766
Perkins 16	34	791
Cooke County (Wildcats)—		
Big Indian Oil & Dev. Co. Morton 2	*	2501
E. F. Peters et al, F. Klement 1	*	2542
Montague County (Wildcat)—		
W. B. Omohundro et al, Seay 1	1920	5704
Wichita County (K-M-A)—		
Deep Oil Dev. Co., Munger 22	248	3880
E. C. Oil Co., Mangold 4-A	552	3856
W. H. Hammon et al, McCarty 18-A	896	3880
Hammon-Hanlon & Buchanan, Hammon 3	1304	4046
Mul-Berry Oil Co., Bradley 6	392	3912
Southport Pet. Co., Wichita River 14-A	384	4008
Wichita County—		
BCE Dev. Co.-C. M. Johnson, George 1	110	1469
Mrs. H. B. Wallace et al, Strauss 1-S, blk 22	100	1082
Wilbarger County—		
King Oil Co., Waggoner Est. 25-C	*	1167
Lawson & Leavell, Waggoner Est. 3-U, sec 109	*	1383
Young County—		
Henry Craig et al Schlagel 1-A, sec 79	50	1126
Chas. B. King et al, Johnson 12, blk 13	*	645
Moran & Wotola Roy. Co., Howard 19, sec 3401	20	913
Travis Oil Corp., Ford 3, sec 1971	520	2802
Young County (Wildcats)—		
P. C. Brashear et al, Jeffery 1, sec 50	*	826
E. D. Willis et al, Routan 1, sec 265	*	780

West Virginia

Calhoun County—		
Ira Bickerstaff, F. D. Busch 1	5	1876
Gilmer County—		
Pittsburgh & W. Va. Gas Co., Lynch 7727	¶.07	2277
Lincoln County—		
United Fuel Gas Co., Sweetland 2281	¶.13	3425
Mingo County—		
T. W. Harvey, Chafin 1	¶.13	2879
Ritchie County—		
S. R. S. Oil Co., Bradley 2	¶.17	1642
Wirt County—		
S. W. Douglass, Pell 67	*	1830

Wyoming

Niobrara County (Lance Creek Field)—		
Continental, Rodeo 6 OPC-4, nw nw ne 35-36n-65w	720	4104
Minnelusa Oil Corp., Mackinnie-Thompson 8, csw ne nw 7-35n-65w	2712	5379
Sweetwater County (Lost Soldier Field)—		
Sinclair-Wyoming Oil Co., Lost Soldier 90-A sw sw nw 11-26n-90w	100	2149

*Failures; †Junked; ¶Million cu. ft. gas.

Set Panhandle proration on acreage, bottom-hole pressure

The Texas Railroad Commission last week entered an order on the Panhandle field, effective April 15, prorating on acreage and bottom-hole pressure basis, 50 percent allocated on each factor. Ten-acre proration units are provided, and no more than 10 acres may be assigned to one well for proration purposes.

Operators will be required to make their own bottom-hole pressure tests under commission supervision. Some 4400 wells are affected.

The new order adopts the standard 10-acre spacing rule provided in an order issued March 12, and also provides that no proration unit shall be more than twice as long as its width.

Commissioner Jerry Sadler explained the 10-acre plan was adopted because the field has been developed on this basis. While bottom-hole pressure tests are being made, the field will be prorated on acreage and potential, with 50 percent allocated on each factor.

Provision is made for scaling down potentials, from 12.5 percent on small wells to as much as 40 percent on those with potentials of 3000 barrels daily or more. It appeared that two or three months might elapse before the pressure tests are completed and the field actually prorated on that basis.

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Houston Oil Company

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WILDCAT REPORT
New Starts and Completions

ARKANSAS

COMPLETION

Little River County—Clark et al, Strawn 1, SEc 17-10s-32w, abnd 1810 ft.

CALIFORNIA

FIRST REPORTS

Fresno County—Erickson & Swanston, Section 22-16-22, Kingsburg area, lcn.

Kern County—Goodrum & Vincent, Inc.'s S. P. 4, Section 31-29-30, Edison area sp, Cal. Crude Petroleum Co.'s No. 5, Section 34-30-22, McKittrick area, lcn.

Tulare County—Tide Water's Newland 35, Section 22-24-23, Trico gas area, lcn.

COMPLETIONS

Kern County—Golden Bear Oil Co.'s Glide 1, Section 19-26-28, Mt. Poso area, topped Vedder 1, 929 ft, 3 ft oil sand at top, abnd. 1962 feet.

Los Angeles County—Mangrum & Page's Lintz 1, Section 4-3-15, Newhall area, abnd 852 feet. Continental Oil Co.'s Weston 1, Section 27-4-14, San Fernando area, formation tester set at 3870 feet, open 40 minutes, recovered 1 stand mud, no oil or gas, no Miocene present, abnd 4260 feet.

GEORGIA

FIRST REPORT

Clinch County—Georgia Resources, Inc., Wilkinson 1, Land Lot 273, Land District 12, materials (2 mi n & 1 mi w same company's Gillican 1).

KANSAS

FIRST REPORTS

Barton County—Hinkle's Kroutwurst 1-A, c n½ ne se 34-16-11w, dr.

Butler County—Carrey et al's Kelley 1, se nw sw 20-27-4e, otd 2660 ft, dr 2800 ft.

Cloud County—Lindsay et al's Leblano 1, c s½ sw nw 35-6s-1w, rig.

Cowley County—Murfin et al's Jarvis 1, cnl sw ne 19-31-5e, rig. McKnab et al's Sherwood 1, ne se sw 4-35-5e, dr.

Ellis County—Dickey Oil Co.'s Stone 1, cnl ne sw 4-11-17w, rur.

COMPLETION

Cowley County—Markey et al's Anderson 1, c n½ ne nw 21-30-3e, 2 mi n Udall pool, top Mississippi 3103 ft, abnd 3211 ft.

NORTH LOUISIANA

FIRST REPORT

Claiborne Parish—Gulf and Ohio Oil Co., G. W. Taylor 1, SE SE 15-23n-8w (10,000 ft test), moving in materials. (Deep test for old shallow Haynesville field.)

COMPLETIONS

LaSalle Parish—H. L. Hunt, La. Central Lbr. Co. 9, NE NE 13-10n-2e, 18 bbls 30.4 gravity oil per hour, td 2993 ft.

Caldwell Parish—Critchett & Wood, Kyle A-1, SWc SW NE 18-11n-3e, elev 211 ft, Saratoga chalk 800 ft, Wilcox 1620 ft, Cane River 1930 ft, drill stem hung 4975 ft, junked 4980 ft.

SOUTH LOUISIANA

FIRST REPORT

Jefferson Parish—Shell and Tide Water's State 1, Bay Des Ilettes area, lcn.

COMPLETIONS

Beauregard Parish — Atlantic's Lutcher Moore 1, Singer area, Section 13-5s-12w, abnd 10,500 ft.

Cameron Parish—Superior's State 1, Calcasieu Lake area, 14s-9w, abnd 2525 ft.

Orleans Parish—W. T. Burton's L. & N. 1, Unknown Pass area, Section 18-11s-15e, abnd 10,405 ft. W. T. Burton's State 1, Lake Pontchartrain area, 10s-13e, abnd 10,134 ft.

MICHIGAN

FIRST REPORTS

Calhoun County—Virgil R. D. Kirkham's Dowding 1, ne ne sw 1s-6w, rig.

Kalamazoo County—Union Oil Co. Aleksich 1, sw nw nw 19-3s-12w, rig.

Kent County—American Dr. Co.'s Linkfield 1, sw ne ne 8-7n-10w, dr.

Muskegon County—Daily Crude Oil Co.'s Shelling 1, nw ne ne 28-9n-15w, rig.

COMPLETIONS

Allegan County—Fred Pope's Harnish 1, ne ne sw 18-4n-12w, Dorr Township, Traverse lime 1568 ft, abnd 1630 ft. W. J. Bernier's Skinner 1, sw sw se 26-3n-16w, Saugatuck Township, Traverse 1423 ft, abnd 1346 ft.

Missaukee County—C. W. Teater's Community Lease 1, c se 31, abnd 1005 ft.

MISSISSIPPI

FIRST REPORTS

Holmes County—Allied Pipe Line Co. Ellis 1, C NE SW 18-14n-4e, dr 800 ft.

Humphreys County—B. J. Crawford & B. A. Hollandale, Fee not given, NE NE 1-13n-14w, materials. Fohs Oil Co., Holaday 1, C SW SW 5-13n-3w, rig up. Showers & Moncrief, State 1, NEc 9-15n-2w, materials.

Stone County—Harry I. Morgan et al, Dantzler Lbr. Co 1, NW SE 8-4s-12w, (7000 ft test).

COMPLETIONS

Issaquena County—German, Lucy & Fair (formerly A. A. Chaney), Mohanna 1, C NE 13-18n-3e, abnd 6024 ft. saltwater sand (Tuscaloosa).

Yazoo County—Robert P. Lake, Exum 1, NE 13-11n-2e, elev 221 ft, top Midway black shale 3247 ft, top Midway chalk 4110 ft, abnd 5327 ft.

OKLAHOMA

FIRST REPORTS

Kiowa County—Car Carter 1, sec 1-7n-17w, lcn.

Noble County—Anderson et al's Wentz 1, c w½ ne sw 11-22n-2e, lcn.

Okfuskee County—Yoakam et al's Long 1, c sw se 34-12n-9e, machine.

Pottawatomie County—Alma Oil Co.'s Harrington 1, nw se nw 24-9n-4e, lcn. Meazel's Billington 1, se ne ne 26-9n-4e, lcn.

Seminole County—Margay Oil Co.'s Reed 1, nw ne ne 12-6n-6e, rig. Murta et al's Ashby 1, c w½ ne se 4-10n-6e, lcn.

Stephens County—Jackson's Ketchum 1, sw nw nw 6-1s-5w, mirt.

Wagoner County—Cahill's McCall 1-A, nec 10-17n-15e, sd 1116 ft.

COMPLETIONS

Comanche County—Mid-Night Oil Co.'s Howe 1, nwc ne 20-2n-13w, 2 mi e Cache, abnd 997 ft.

Garfield County—Fain Dr. Co. et al's Schankenberg 1, ne se sw 31-21n-4w, 3 mi nw Brown pool, top Viola 6395 ft, abnd 6542 ft.

Garvin County—Sanders' Buckner 1, nwc sw 27-1n-2w, 7 mi e Tussy pool, abnd 3004 ft.

EAST TEXAS

FIRST REPORT

Navarro County—M. M. Johnson et al's Fleming 1, J. Smith sur, 5 mi se Corsicana, rig.

COMPLETION

Falls County—R. D. Salisbury et al's Shankle 1, J. A. Manchaca sur, 1½ mi ne Chilton, elev 482 feet, Austin chalk 710-874 ft, Buda 1086 ft, Georgetown 1185 ft, abnd 1274 ft.

NORTH TEXAS

FIRST REPORTS

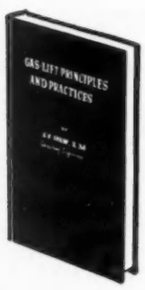
Archer County—L. T. Burns et al's Meurer 1, sec 102, blk 4, Clark-Plumb sur, 2½ mi w by n Windthorst, sp on 1300-ft test. Walter H. Gant et al's Vogtsberger 1, 1400 ft out of NEc blk 3, German Emigration Co. sur A-146, dr 2600 ft. Shappell Oil Co.'s Hale 1, sec 95, HS of CR sur, 5½ mi w by s Archer City, mim for 1200-ft test.

Clay County—Alexander Goldsmith et al's Republic Natural Gas Co. 1, blk 14, Parker County School Lands, 2 mi s Petrolia, lcn for 4500-ft test. S. S. Staley et al's Dunn 1, blk 138, Byers Bros, subd, rur for 1400-ft test.

Cooke County—Ross-C. E. Marshall-Wm. Tolbert & W. J. Rutledge's Stark-Sinclair Prairie 1, BBB&C sur A-155, lcn for 5500-ft test.

Montague County—R. H. Roark et al's Howard 1, F. Robertson sur A-620, 3 mi w Spanish Fort, sp on 2000-ft test.

GAS-LIFT PRINCIPLES AND PRACTICES



By S. F. SHAW, E. M.
Consulting Engineer

This book is largely based on a series of lectures on gas lift delivered before the Petroleum Engineering Department of the Agricultural and Mechanical College of Texas on November 9th and 10th, 1939, by the author as special lecturer of the Department of Petroleum Engineering.

A history of the development of the air-gas lift is given, covering operations in air and gas-lift, and noting some of the inventions that have been patented in connection with this work.

The performance data in the numerous tables are selected from some 15,000 actual field tests made to determine the best rates at which to produce a well, these tests being made by the author or under his supervision, in many fields of the United States and foreign countries.

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TEXAS GULF COAST

FIRST REPORTS

Brazoria County—Rowan & Broun's McIlvaine 1, Alvin area, H. C. H. & B. sur, lcn. Rowan & Nichol's Hubbard 1, Liverpool area, W. Harris, sur, lcn.

Harris County—Thompson Dr. Co.'s Highlands Farms Dev. Co. 1, Highlands area, blk 46, J. White sur, lcn.

COMPLETIONS

Galveston County—Sun's State 1-178, East Bay area, aband 8210 ft.

Wharton County—Magnolia's Swanson 1, se of El Campo, sec 39, E. T. R. R. sur, abnd 6598 ft.

WEST CENTRAL TEXAS

FIRST REPORTS

Eastland County—Steele & Black's Poe 1, sec 6, blk 2, lcn for 900 ft test.

Jones County—Jones - Stasney - Groover & Rose's Humphrey 1, w½ sw¼ sec 192, BBB&C sur, machine for Palo Pinto test.

COMPLETIONS

Eastland County—Keough et al's Walter's 1, H&TC sec 83, blk 3, water sand 3436-71 ft, abnd 3514 ft.

Jones County—C. W. Byron & Grisso Royalty Co.'s Gray 1, s½ nw¼ sec 25, Deaf & Dumb Asylum Lands, elev 1571 ft, top lime 3294 ft, abnd in sul water 3334-52 ft.

WEST TEXAS

FIRST REPORTS

Crane County—Gulf's Waddell 31, nw se sw PSL sec 5, blk B-24, bldg road.

Scurry County—Coffield & Guthrie, Inc.'s Mooar 1, c nw H&TC sec 334, blk 97, lcn for 4500-ft test.

Tom Green County—L. D. Gibson et al's Pugh 2, James Eldridge sur 73, sp on 600-ft test.

COMPLETIONS

Concho County—Natural Resources, Inc.'s Armour-Murray 1, sec 105, blk 72, elev 2059 ft, abnd 1565 ft.

Crockett County—Continental and unit members Todd 2-B, sec 29, blk WX, elev 2475 ft, lime 1180 ft, Crinoidal lime 5590 ft, basal Pennsylvanian pay 5634-90 ft, Simpson 5690 to 5691½ ft, flowed 350 bbls 40.6-gravity oil 3 hrs via 2-inch casing outlet with 1,275,000 ft gas daily.

Scurry County—Dennis & White's Winston 1, sec 153, blk 3, abnd 520 ft.

NORTH TEXAS

COMPLETIONS

Archer County—L. T. Burns et al's Munchrath 1, blk 4, Clark-Plumb sur, abnd 1137 ft. Continental Oil Co.'s Wilson-McCrory 1-A, H&TC sec 20, A-1198, Bend lime 5144 ft, abnd 5250 ft after pb and testing lower and upper Strawn, using acid.

Clay County—D. A. Kahn, tr's Fultz 1, Byers Bros. subdiv, abnd 1370 ft. T. A. Norwood et al's Parker 1, blk 128, Byers Bros. subdiv, abnd 1708 ft. Staley Oil Co.'s Phariss 1, blk 49, Specht-McCutcheon sur, abnd 1469 ft.

Cooke County—Big Indian Oil & Dev. Co.'s Morton 2, sec 1, A-365, abnd 2501 ft. E. F. Peters et al's Klement 1, lot 12, Thos. Scott sur, A-900, Ellenberger 2330 ft, abnd 2542 ft.

Montague County—W. B. Omohundro et al's Seay 1, sec 32, blk 4, 3½ mi s Ringgold, black shale 5600 ft, Bend lime 5654 ft, conglomerate pay 5692-5704 ft, flowed 240 bbls 47-gravity oil 3 hours open tubing natural, casing pressure ranged from 1420-1100 lbs and tubing pressure 1320 to 330 lbs.

Young County—P. C. Brashear et al's Jeffery 1, sec 50, abnd 826 ft. E. D. Willis et al's Routan 1, sec 265, abnd 780 ft.

SOUTH TEXAS

FIRST REPORTS

Calhoun County—Eurabee Oil Co.'s Traylor 1, Sec. 3 I. & G. N. Sur., Greens Lake area, lcn.

Duval County—Bridwell Oil Co.'s Parr 1, J. Poitevent Sur. 276, 9 mi nw San Diego, 1½ mi sw Fitzsimmons fld., lcn. Sun's Garcia 1, AB & M Sur. 407, 2½ mi e Fitzsimmons fld, lcn. Stewart & Nye's Peters 1, B. S. & F. Sur. 761, 2 mi e Lopez fld, mir.

Jim Wells County—M. M. Miller's Fee 1, Sec. 58, J. B. Dibrell subd. of Wade Ranch, Juan Jose de la Garza Montemayor "Casa Blanca Gr," 12 mi ne Wade City fld., rig. W. B. Osborne's Almond 1, Hiram Riggs Sur, 14, 7 mi n & e Alice, lcn.

Live Oak County—Luling O. & G. Co.'s Byler Est. 2, A. A. Dinn Sur. 14 mi s George West, mov. in rig.

McMullen County—Rhea Nixon et al's Horton 1, James M. Jean Sur. No. 29, 4 mi se Tilden, dr 680 ft.

Medina County—H. T. Crawford's Langford 1, F. Saur Sur. 117, 10 mi se Medina, lcn.

Nueces County—Richardson Pet. Co.'s Studer 1, George H. Pauls subd. Driscoll Ranch, Shell farmout, 1 mi n Robstown, woc 1000 ft.

Travis County—T. V. Little's Darlington 1, O. Buckman Sur. lcn. Sprouts & Hinn's Bohn 1, 4 mi e Austin, lcn.

Williamson County—James F. Griswell's Baker 1, Metcalf Sur., 6 mi se Liberty Hill, lcn.

Zapata County—Hiram E. Hall's Slator 1, blk 89, Mission Oil Co. subd, Slator Pasture, Barrego Grant, lcn.

COMPLETIONS

Bee County—Bunte Brother's Earnest 2, Bee County School Land Sur. 17, 6 mi nw Skidmore, 13⅜-inch csg. 600 ft, 9⅝-inch csg 5980 ft, sds 5834-54 and 9623-38 ft, PB DST 5830-5847 rec. 1620 ft brackish water, 115 pres 1 hr, abnd 9956 ft.

Calhoun County—R. N. Ranger et al's Wilson 1, 172-ac tr, Valentin Garcia Gr., 5½ mi sw West Ranch, 5 mi nw Port Lavaca, sds 5092½-99 & 5144-49 ft, Discorbis 4509 ft, Het 4905 ft, Frio 5249 ft, abnd 6525 ft.

Guadalupe County—D. Eickenroht et al's Oelkers Est. 1, 115 ac tr in Sec. 206, Antonio Maria Esnaurizar L. I. League Gr., 3 mi sw of Geronimo, Edwards 1007 ft, abnd 1103 ft.

Jackson County—John Coffee & D. C. Norwood's Genthlin 1, O. S. York Sur, 1½ mi sw Maritz field, Brazos-Young Corp. farmout, abnd 6007.

Starr County—Herbert Ald's Salina 1, Share 8-A Por 72, 5 mi w Rio Grande City, 8¼-inch csg 50 ft, abnd 750 ft.

Travis County—Lane & White's Wells Est. 1, John Harper Sur. 42, 4 mi ne New Sweden, abnd 1695 ft.

Jim Wells County—Republic Nat. Gas Co.'s Adams 1-C, Waldron Oil & Gas subd, GH&H Sur. 103, 1 mi nw of Alfred shallow producers, abnd 4750 ft.

Michigan Geological Survey shifts field personnel

The West Branch field office of the Michigan State Geological Survey will be closed after March 31, and Robert Lane, in charge of the office, will be transferred to Mt. Pleasant. Gordon Pringle, now at the Allegan office, will be transferred to Lansing. Rex Grant recently was named to succeed Red Newman as assistant state geologist. Newman resigned to join Smith Petroleum Company.

Michigan court rules on railroad right-of-way

In a divided opinion, 5 to 3, the Michigan Supreme Court last week affirmed a circuit court decision holding that railroads acquire only surface rights and not fee simple when they purchase right-of-way, and that mineral rights remain with the previous owner.

The decision was in an appeal in the Gladwin County circuit court. Michigan Central Railroad Company and others brought suit against Garfield Petroleum Company et al, claiming oil rights on right-of-way in the Buckeye field, Gladwin County.

Texas body recesses hearing on Griffin and Avoca fields

The Texas Railroad Commission has recessed its hearings on the Griffin and Avoca fields, Jones County, until more evidence can be secured. The hearings were called last week on the method of allocation.

Iron Mountain Oil Company seeks a 10-acre tolerance for undrilled units. The fields now have 10-acre spacing. The program was protested by Fain-McGaha Oil Corporation and Sinclair Prairie Oil & Gas Company.

Hull-Silk booster station damaged by explosion

An explosion and fire damaged the Hull-Silk field booster station of Sinclair Refining Company, March 20, resulting in the death of one workman. Three others were burned. Edwin Thomas Michael, 49, connection foreman and an employe of the company for 23 years, died in a Wichita Falls hospital the following day. Burns were sustained by C. W. Clark, H. A. Hoing and H. C. Morgan.

Ask 20-acre spacing for Pottawatomie County pool

Twenty-acre spacing has been requested for the Northeast Shawnee pool, Pottawatomie County, Oklahoma, by Atlantic Refining Company.

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WELL LOGS. Drillers' logs of approximately 4,000 wells drilled in New Mexico are available from Well Log Division, New Mexico Bureau of Mines & Mineral Resources, Socorro, New Mexico. Write for price list A.

NOTES FOR THE Equipment Buyer and User

Mud Gun

PATTERSON-BALLAGH CORPORATION

A new type mud gun has been announced by Patterson-Ballagh Corporation, 1900 East 65 Street, Los Angeles, to supplement the standard mud gun marketed by the company for several years.

Designated the Super Universal Mud Gun, it is designed with a double flow but with a single outlet. The double flow is designed to eliminate the hydraulic reaction which causes mud guns to spin. Two flow lines form a Y-fitting from the double flow element, connecting with the outlet pipe. A locking device holds the gun in any desired fixed vertical position, and the operating handle is adjustable to different angles to best meet the convenience of the operator. The gun was designed particularly for use where mud must be jetted on a 24-hour basis. Rubber nozzles are available. The inlet and outlet discharge of the gun is 2 inches and the complete assembly weighs 84 pounds.

Patterson-Ballagh Mud Gun

Diesel Engine

INTERNATIONAL HARVESTER COMPANY

A new 6-cylinder Diesel power unit that develops 100 horsepower at 1400 r.p.m, has just been announced by the International Harvester Company, 180 North Michigan Avenue, Chicago.

The engine, designated model UD-18, starts on gasoline and, after a minute or less of operation shifts to full Diesel operation. It can be cranked by hand. A standard 12-volt electric starting system may also be utilized to provide electric starting.

The unit is of compact construction and is provided with heavy, large-diameter flywheel. It has ample weight, approximately 3875 pounds less fuel, oil and water, and reserve strength for

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When your well ceases to flow and pumping is necessary, save money by installing a

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OIL BOOKS

Practical Petroleum Engineers Handbook—Joe Zaba & W. T. Doherty	$ 5.00
Gas-Lift Principles and Practices—S. F. Shaw	3.00
The Practical Geology of Oil—Wm. W. Porter II	1.50
Petroleum Dictionary—Hollis P. Porter	3.00
Service Station Selling—Grady Triplett	1.00
Acidizing Handbook—Benson M. Kingston	1.50
Petrographic and Physical Characteristics of Sands from Seven Gulf Coast Producing Horizons—M. T. Halbouty	1.50
Origin and Environment of Source Sediments of Petroleum—Parker D. Trask and C. C. Wu	6.00
Texas Oil & Gas Since 1543—Chas. A. Warner	5.00
Petroleum Production Engineering—Vol I—Development—Uren	5.00
Petroleum Production Engineering—Vol. II—Exploitation—Uren	6.00
Petroleum Production—Wilbur F. Cloud	5.00
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Gas Engineer's Handbook	7.50
Practical Oil Geology—Dorsey Hager	4.00
Mechanical Engineer's Handbook—(Power)—Kent	5.00
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Seismographing for Oil—E. G. McKinney	1.00
A Source Book in Geology—Mather & Mason	5.00
Waverly Handbook { Regular binding / Deluxe binding	1.50 / 2.00
Deep Borehole Surveys & Problems—M. H. Haddock	4.00
Gulf Coast Oilfields	4.00
Henley's Twentieth Century Formulas, Recipes & Processes	4.00
Chemical Engineer's Handbook—John H. Perry	9.00
Analytical Principles of the Production of Oil, Gas and Water from Wells—Stanley C. Herold	7.50
Natural Gas Handbook—Diehl { Cloth / Leather	5.00 / 6.50
Field Geology—Frederick H. Lahee	5.00
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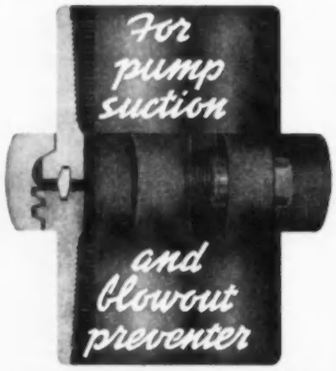

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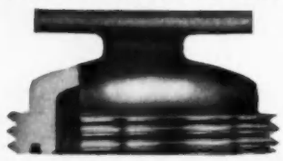

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NOTES FOR THE Equipment Buyer and User

heavy-duty service. Cylinders are individually replaceable and are specially heat-treated. Cylinder bore and stroke are, respectively, 4¾ and 6½ inches. Piston displacement in 691 cubic inches, regular full-load governer speed 1400 r.p.m., and maximum torque 430 pounds-feet at 800 r.p.m.

The 7-bearing crankshaft is an alloy-steel drop forging. All bearings are replaceable and are diamond-bored for accurate size and shape and long life. A thermostatically-controlled cooling system and pressure lubrication through drilled passages are provided for efficient and economical operation.

The clutch is of the heavy-duty over-center type. It is 17 inches in diameter and has 312 square inches of friction facing area. It locks in or out of engagement. When clutch is disengaged, springs free a lightweight driven disk which is splined to the power take-off shaft. Clutch torque capacity is 1488 pounds-feet.

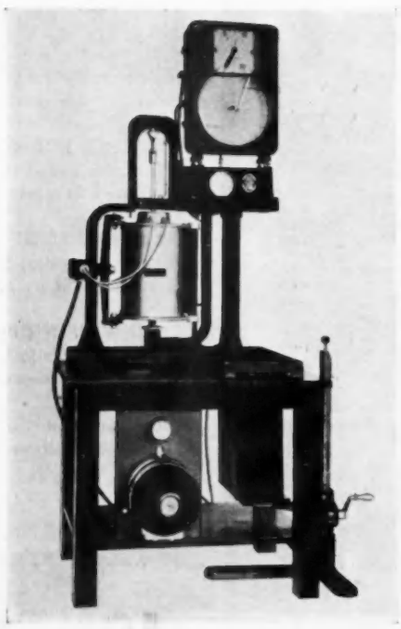
Dilatometer

THE BRISTOL COMPANY

A new dilatometer has been announced by The Bristol Company, Waterbury, Connecticut.

Designated Model RB, it is a direct reading dilatometer which both indicates and makes an ink record of time-dilation and temperature-dilation changes simultaneously during heating and cooling cycles of ferrous and non-ferrous metals, ceramics and other materials of rigid form.

Temperatures are recorded on a Bristol Pyromaster Potentiometer, 12-inch round chart, and the time element is recorded by a separate pen through a Telechron clock.

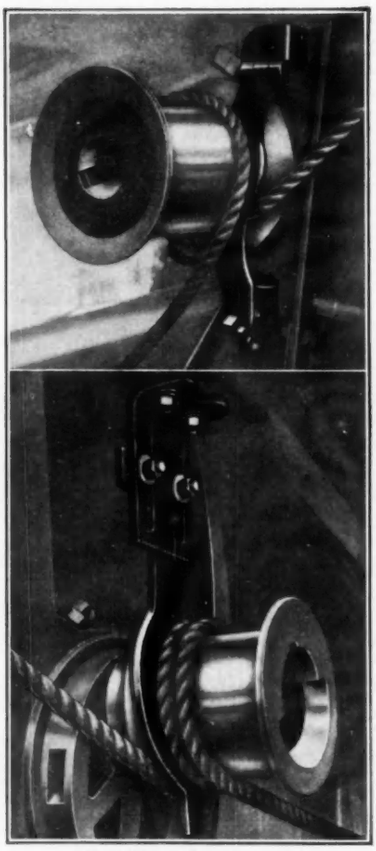


Bristol Dilatometer

Rope Guard

BYRON JACKSON COMPANY

A cathead attachment designed to eliminate cathead accidents due to tangling or fouling of the catline is now available from Byron Jackson Company, Box 1307, Arcade Station, Los Angeles. This device, designated



BJ Elliott Rope Guard

the BJ Elliott Rope Guard, consists of a curved arm suspended from above the cathead, which separates the first and second wraps of the line. A latching device on the bottom and a hinge at the top permit the arm to swing outward for easy removal or placement of the rope.

Separators

A new 8-page bulletin, designated publication 2950, has been issued by Cochrane Corporation, Seventeenth Street and Allegheny Avenue, Philadelphia, on baffle-type moisture and oil separators for use in vertical or horizontal steam, gas and air lines. It contains cross-section photographs and line drawings of three popular types of line separators built for lines ranging from ½-inch to 30 inches in diameter. Complete design, dimension and construction data is given with list prices. Data on proper drainage, gage, fittings and auxiliary equipment is also furnished.

NOTES FOR THE Equipment Buyer and User

Traveling Block

REGAN FORGE & ENGINEERING COMPANY

A new traveling block for 400- and 500-ton capacities has been announced by Regan Forge & Engineering Company, Box 150, San Pedro, California. It is a narrow block with 5 or 6 sheaves, completely enclosed with streamlined safety guards. For 5 sheaves, the width is 23 inches, and for 6 sheaves 26½ inches. Height of the block is 125 inches. The sheaves are of special-alloy cast steel with grooves ground to A.P.I. specifications. Rims are machined parallel, and spokes and hubs of all sheaves are subject to impact test to eliminate those having excessive shrink stresses. The sheaves are statically balanced.

Regan Traveling Block

Anti-friction roller bearings handle the tonnage with a margin of safety of 3 to 1. Inner plates are of ASTM Class A 95-36 steel castings, with sufficient ribs disposed to relieve casting strains. Bearings are of SAE 3135 forged steel, carburized and heat-treated. Main connecting pins are of SAE 1030 rolled steel machined to maintain perfect alignment of bearings. Due to narrowness of the block, it can be operated close to large stacks of drill pipe. It is known as the Type H 104" Narrow Traveling Block.

Mixers

Mixing Equipment Company, 1090 Garson Avenue, Rochester, New York, has issued a new 16-page catalog describing its line of mixers for pressure, vacuum and open vessels. It gives specifications, construction details and methods of mounting for various models. Photographs and line-drawings illustrate applications and construction features. A section gives engineering details and suggestions on typical installations.

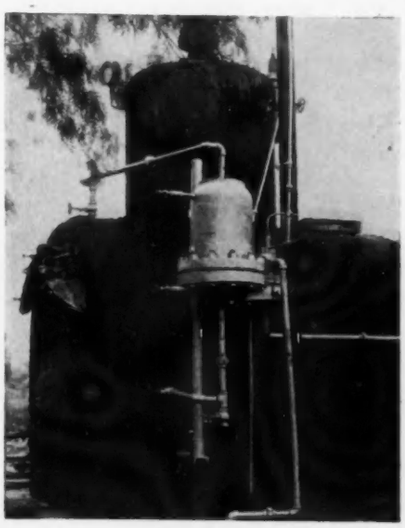
Boiler Water Flow

W. C. FAUST

A safety device to automatically control the flow of water and heat in boilers on drilling rigs has been designed by W. C. Faust, Clarkwood, Texas. It was first used on a rig in the Saxet field, Nueces County.

Attached to the side of the boiler, the device consists of dome-like unit containing a float connected to the boiler water chamber so that it fluctuates with the water level in the boiler. When the fluid level lowers to a set point, the float opens a valve, starting the feed pumps. As the boiler fills the float rises and the feed pumps are closed when the desired level is reached.

A valve connected to the pop-off vent on the boiler controls the size of the fire by means of valve opening and closing when blowing off of steam. The quantity of steam blown off gauges the size of the fire.



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The Side Door Choke is placed in the tubing any desired distance above a tubing formation packer which separates the oil and gas horizons. Positive control of the amount of gas introduced into the tubing from above the packer is obtained through the small orifice in the side of the choke cup mandrel. The removable check valve prevents any excess pressure in the upper formation from entering the lower formation when tubing is closed in at the surface.

The Otis Side Door Choke is run and pulled under pressure on a measuring line, automatically locking itself in its special landing nipple.

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U. S. Geological Survey, Washington, D. C.

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Carl W. Correns, Stina Gripenberg, W. C. Krumbein, Ph. H. Kuenen, Otto Pratje, Roger Revelle, F. P. Shepard, H. C. Stetson, Parker D. Trask, Chairman

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NOTES FOR THE Equipment Buyer and User

Powell Handling Tube Sales for Mid-Continent Supply Company

Harry O. Powell, who recently resigned as manager of tubular sales in the Texas division of National Supply Company, has become associated with Mid-Continent Supply Company, Fort Worth, as manager of the tubular division. He is an authority on oil country pipe and casing requirements, having devoted half of his 30 years' service in the supply business to selling tubular products. Powell entered the services of National Supply Company at his boyhood home, Muncie, Indiana, as a clerk, advanced to store manager, and was transferred to Fort Worth in 1918 on the strength of the Ranger boom.

David T. Marvel Joins National Tube Company

David T. Marvel, former manager of tube sales for the Steel and Tube Division of Timken Roller Bearing Co., Canton, Ohio, has joined National Tube Company as assistant manager of sales, Ellwood Sales Division, Ellwood City, Pennsylvania.

Kirkpatrick Named Vice President of Landis Machine

C. N. Kirkpatrick, vice president in charge of sales and secretary of Landis Machine Company, has been elected vice president and general manager. J. H. Elliott, purchasing agent for the company, has been named secretary to succeed Kirkpatrick, and will also continue his purchasing duties.

Cutler-Hammer Names Anderson Branch Manager at Dallas

Cutler-Hammer, Inc., Milwaukee, manufacturers of electric control apparatus, has announced the appointment of E. K. Anderson as manager of the company's branch office at Dallas. Serving Arkansas, Texas, Oklahoma and the southern part of New Mexico, the office is under the direct supervision of G. E. Booth, district manager at St. Louis.

E. K. ANDERSON
Dallas Branch Manager, Cutler-Hammer, Inc.

HARRY O. POWELL
Named Manager Tubular Division of Mid-Continent Supply Company

Gravimetric Survey Corporation Establishes Laboratory in Tulsa

Gravimetric Survey Corporation, of which C. H. Frost is president and R. C. Sweet is secretary-treasurer, has established a laboratory and machine shop at 628 East Third Street, Tulsa.

The firm manufactures gravity meters under license from Standard Oil Development Company, owners of patents on Hartley Gravity Balances. The company also engages in consulting geophysical work. Otto Krause is instrument maker.

Hercules Powder Company Stockholders Re-Elect Directors

At the annual stockholders meeting of Hercules Powder Company recently, all directors were re-elected for the coming year. They are: R. H. Dunham, C. A. Higgins, T. W. Bacchus, C. D. Prickett, G. G. Rheuby, L. N. Bent, C. A. Bigelow, C. C. Hoopes, G. M. Norman, A. B. Nixon, P. B. Stull, M. G. Milliken, W. R. Ellis, Lloyd Kitchel, P. W. Meyeringh, and E. B. Morrow.

Gas Laboratories, Inc., Establishes Headquarters in Houston

Gas Laboratories, Inc., has announced opening of general offices in the Commerce Building, Houston. E. O. Buck and A. S. Parks, consulting engineers and geologists, are the company's organizers, and Dr. Judson S.

NOTES FOR THE Equipment Buyer and User

Swearingen, research chemist at the University of Texas, is associated with the firm in an advisory capacity.

All specific problems of recycling, including physical tests of gas, plant design, development and production programs, are included in services available through the company. The firm is equipped with portable testing apparatus to determine the physical analyses of wet gas and the retrograde behavior of the liquid product in the field, and give actual preliminary surveys of the expected liquid yield from the wells to enable the operator to better plan his spacing and development programs.

Belts

Chicago Belting Company, 113 North Green Street, Chicago, has issued a new 24-page catalog illustrating its line of leather belting and their various applications. The booklet describes manufacture and testing of its products, gives information on its consulting engineering service on mechanical power transmission by belting, supplies tables on horsepower ratings for flat leather belting, and describes a method for making leather belts endless.

Pumps

Warner Lewis Company, 230 East Third Street, Tulsa, has a new circular on its L-ZR utility pumper. The unit, according to the circular, may be used to handle crude oil, tank bottoms, natural gasoline, naphtha, road oil, butane, water, mineral seal and other products.

Ligon Named Houston Agent for Gulf Coast Laboratories

Gulf Coast Laboratories, 3415 Agnes Street, Corpus Christi, has appointed Jack Ligon, formerly of Corpus Christi, as representative in the Houston territory. He will be located at 515 Sul Ross Street, Houston.

The company manufactures water-treatment chemicals for eliminating scale and crystallization in boilers. It will carry a complete stock of boiler cleaning compounds in Houston, and will have an adequate staff of service men to take care of boiler needs.

Petroleum Exposition to Honor Ten Old-Timers

Ten pioneers of the oil industry will be honored by the International Petroleum Exposition in Tulsa, May 18 to 25, when gold medals will be awarded by the old-timers committee, according to H. R. Gruber, chairman.

Only two awards have been made at previous expositions, but this year the committee has decided to recognize pioneers in various divisions of the industry. Awards will be made to representatives in these branches: production, pipeline and transportation, refining, marketing, supplies and equipment, natural gasoline, natural gas, purchasing agents, land and legal, and "Pioneer of Pioneers."

The "Pioneer of Pioneers" award will be made on the basis of service and contribution to the industry regardless of division. All nominations

Members of the old-timers committee, from left to right are: (Seated) S. F. Bell, Jim P. Flanagan, W. J. Stewart, Hal R. Gruber and J. J. Larkin; (standing) Fred Cook, Mike Flanagan, J. S. Sidwell, Dal Dalrymple, J. E. Johnson, J. K. McGoldrick and F. G. McClintock.

The Hall Spiral Casing Guide DOES 4 IMPORTANT JOBS AT ONCE!

Spiral spring blades on the Improved Hall Casing Guide contact the entire mud column and the **complete circumference** of the wall . . .

(Patents Pending)

1 **Trowels the wall of the hole,** removing superfluous mud and delivering the weight back to the mud column. Enlarges the hole again to maximum size, allowing the gas to remain in a short horizontal space between casing and hole wall, rather than channeling vertically up the hole. Delivers the circulation back to the bore of the well, allowing the capillary action of the water supported by the mud column pressure to keep the gas pressure beyond the bore of the well—thus helping tremendously in preventing blowouts.

2 **Breaks viscosity** in complete mud column, eliminating channeling.

3 **Centers casing shoe** when passing obstructions, caves, whipstocks, casing windows, etc.

4 **Centers casing string** to assure uniform cement flow.

RESULT—The Hall Casing Guide preconditions the walls . . . helps eliminate blowouts . . . and assures tighter, more uniform cement jobs.

EASY INSTALLATION

To install, slide spiral guide over the casing to desired position with keyed slot in down position. Clamp guide to casing with rope binder until guide has desired diameter. Weld keys to casing. Remove binder and the outside diameter of the spiral springs is then at set diameter. On streamline pipe, split spiral guide vertically with cutting torch, place around casing, and re-weld.

Order through any recognized supply house. If your supply house does not have our Spiral Guide in stock, phone or wire any of our offices, at our expense, and delivery will be made promptly.

PRICE LIST (Effective March 1, 1940)

Casing, Size	O.D. Guide Collars	No. Springs	Price Including Freight
4½"	5 11/16"	5	$45.50
5"	5 11/16"	5	46.00
5½"	6⅛"	5	46.50
5¾"	6⅜"	5	48.00
6"	6⅝"	6	48.50
6⅝"	7¼"	6	49.00
7"	7⅝"	6	49.50
7⅝"	8 11/16"	7	51.00
8⅝"	9 11/16"	8	52.50
9"	9⅝"	9	54.00
9⅝"	10 7/16"	9	55.50
10¾"	11 7/16"	10	57.00
11¾"	12 11/16"	11	58.00
13"	13⅝"	13	60.00
13⅜"	14 11/16"	13	61.50
16"	16 11/16"	16	65.00

Standard length of guides, 42". Standard spring bow, 5" beyond casing diameter. Spring width, 1½". Spring thickness, ⅛" and 3/16". 3/16" is recommended only in well orientation or where guide is run 1,000' or more above the shoe.

HOUSTON PIPE APPLIANCE CO.

Houston • 1601 Wesley St., Phone Wayside 4050
Tulsa • 310 Thompson Building
Los Angeles • P. O. Box 5842 Metropolitan Sta.
Telephone Hollywood 1792

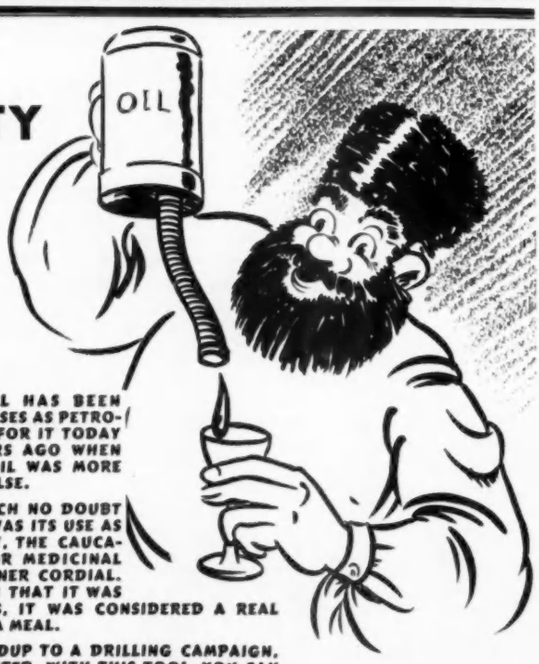
made for a particular branch will also automatically become nominations for the "Pioneer of Pioneers" award. All nominations must be in the mail by April 20 to receive consideration. Blanks and rules may be obtained by writing the old-timers committee, International Petroleum Exposition, Tulsa.

For the purpose of seeking nominations from each branch of the oil industry, the old-timers committee has set up sub-committees. Sub-commmittee chairmen are: W. M. Bovaird, president, Bovaird Supply Company, Tulsa, supplies and equipment; Phil H. Bohart, vice president in charge of production, Gulf Oil Corporation, Tulsa, production; John C. Day, secretary-manager, Western Petroleum Refiners Association, Tulsa, refining; R. W. McDowell, vice president and general sales manager, Mid-Continent Petroleum Corporation, Tulsa, marketing; J. K. McGoldrick, president, The Texas Pipe Line Company of Oklahoma, Tulsa, pipeline and transportation; William Lowe, secretary, Natural Gasoline Association of America, Tulsa, natural gasoline; Joseph Bowles, president, Oklahoma Natural Gas Company, Tulsa, natural gas; H. M. Cosgrove, secretary, Purchasing Agents Association of Tulsa, purchasing agents; and Clarel Mapes, secretary-treasurer, Mid-Continent Oil & Gas Association, Tulsa, land and legal.

Each sub-committee chairman has appointed members representing the important oil areas of the country.

It's a Fact — Johnston

48 GRAVITY STUFF!



PROBABLY NO OTHER MINERAL HAS BEEN ADAPTED TO AS MANY DIFFERENT USES AS PETROLEUM. MOREOVER, SCORES OF USES FOR IT TODAY ORIGINATED THOUSANDS OF YEARS AGO WHEN IN MANY PARTS OF THE WORLD OIL WAS MORE OF A CURIOSITY THAN ANYTHING ELSE.

BUT ONE EARLY USE FOR OIL, WHICH NO DOUBT IS LOST TO THE WORLD FOREVER, WAS ITS USE AS A LIQUEUR! IN THE 18TH CENTURY, THE CAUCASIANS DRANK OIL – NOT ONLY FOR MEDICINAL PURPOSES – BUT AS AN AFTER-DINNER CORDIAL. ITS BIG DRAWBACK PROBABLY WAS THAT IT WAS NON-INTOXICATING. NEVERTHELESS, IT WAS CONSIDERED A REAL BRACER WITH WHICH TO WIND UP A MEAL.

AND TO ASSURE A SUCCESSFUL WINDUP TO A DRILLING CAMPAIGN, USE THE JOHNSTON FORMATION TESTER. WITH THIS TOOL, YOU CAN TEST THE POSSIBILITIES OF EVERY ZONE ENCOUNTERED IN YOUR WELLS . . . FIND OUT WHICH ARE WET, WHICH ARE DRY, AND WHICH WILL PRODUCE OIL OR GAS. YOU CAN PLAN YOUR COMPLETION PROGRAM IN ADVANCE, KNOWING WHAT YOUR EQUIPMENT NEEDS WILL BE BEFORE CASING IS SET. A JOHNSTON FORMATION TEST IS SIMPLE AND EASY TO MAKE, AND IT PROVIDES ALL THE INFORMATION YOU NEED TO MAKE EVERY DEVELOPMENT DOLLAR GO FARTHER.

THE ILLUSTRATED JOHNSTON ENGINEERING BROCHURE 43, MAILED WITHOUT OBLIGATION, TELLS ALL THE IMPORTANT FACTS ABOUT JOHNSTON TESTING METHODS. IT'S YOURS FOR THE ASKING – WRITE TODAY.

Johnston

$$$$ FIVE DOLLARS ($5.00) WILL BE PAID FOR EACH INTERESTING OR UNUSUAL FACT CONCERNING THE PETROLEUM INDUSTRY (EITHER IN THE UNITED STATES OR ABROAD) WHICH IS USED IN THIS SERIES OF JOHNSTON ADVERTISEMENTS. SUBSTANTIAL PROOF MUST ACCOMPANY EACH CONTRIBUTION. WHEN TWO OR MORE SIMILAR FACTS ARE SENT IN, THE AWARD WILL BE GIVEN TO THE FIRST ONE RECEIVED . . .

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"Servicing California and Selling Exclusively Foreign"

FORMATION AND CASING TESTING — JOHNSTON

JOHNSTON Oil Field Service Corp.
5702 NAVIGATION BLVD.
HOUSTON, TEXAS
"Servicing Mid-Continent and Gulf Coast"

"WHY SET CASING BEFORE YOU KNOW!"

Supply Personals

Charles M. Chapman is now representing Cochrane Corporation, Philadelphia, in the Cincinnati territory. Covering parts of Ohio, Indiana and Kentucky, his office in Room 715, Schmidt Building, Cincinnati.

M. B. "Mac" McElhannon, office manager for Reed Roller Bit Company at Casper, Wyoming, is being transferred to the company's main office at Houston.

W. G. Green, Engineering Laboratories, Inc., Tulsa, has been named chairman of the entertainment committee of the Nomads Club of Tulsa, succeeding the late W. R. Braden.

Albert E. Rapp, 65, president and manager of the Texas Torpedo Company, died at Electra, Texas, March 26, of a heart attack.

B. B. Lacy, 54, sales manager for Turbolite, Inc., died suddenly March 23 at his home in Houston. Long identified with the petroleum industry, Lacy with Henry E. Elrod, Houston, obtained patents covering Turbolite generators. He had been associated with Turbolite, Inc., since its organization four years ago.

Valve Slide Chart

A slide chart has been prepared by engineers of Merco Nordstrom Valve Company, 400 Lexington Avenue, Pittsburgh, Pennsylvania, permitting engineers to instantly ascertain the figure number of a valve in any available size for any pressure. Instead of leafing through a catalog, the engineer can use this slide-rule chart which, by simple manipulation, locates and classifies the information.

The various tables are made up and re-made by sliding a card back and forth under window openings in the slide holder. The chart includes information on semi-steel, steel and malleable iron valves. It is designated Form V-130.

V-Belts

Allis-Chalmers Manufacturing Company, Milwaukee, has a revised catalog section, No. 151, introducing new horsepower ratings for multiple V-belt drives based on the formula developed by Robert F. Vogt and recently adopted by the industry. It provides engineering information on selection of belt sizes for horsepower rating, speed, center distances and sheave diameters.

Enamel

Baer Brothers, 438 West 37th Street, New York, announces a chart showing the 22 colors in which its abrasion-resisting enamel, Baertex, is now available. The product had formerly been available only in battleship gray. It is for use on concrete floors and other interior surfaces where a glossy, long-wearing overnight-drying finish is desired, and is also intended as a hard-wearing gloss wall paint.

Squeaks from the Bull Wheel

Ahem

Teacher—When I was your age, I could answer any question in arithmetic.

Tommy—Yes, miss; but you had a different teacher.

Why They Laughed

In large gilt letters across the window was the sign: "Ma's Bakery," and just underneath, boldly printed in red, were the words: "Pop on Ice."

Cafe Society

"Are you the girl who took my order?"

"Yes, sir."

"Well, I declare, you don't look a day older."

Disqualified

"Is your son going to be married?"

"No, I don't believe he ever will. He's studying for a bachelor's degree."

Revelations

"Say, Pete, your girl looked quite tempting in that biblical gown she wore last night."

"What do you mean, biblical gown?"

"Oh, you know, sort of lo and behold!"

Japanese Defense

"Did I ever tell you how I tried jiujitsu on a burglar?"

"No."

"Well, I got hold of his leg and twisted it over his shoulder. Then I got hold of his arm and twisted it round his neck, and before he knew where he was I was flat on my back."

Inquisitive

Arriving at a strange hotel, a fussy woman thought she'd better know where the fire escape was. So she started exploring. During her tour, she opened a door and found herself in a bathroom occupied by an elderly gentleman.

"Oh, I'm sorry!" she twittered. "I was looking for the fire escape."

Continuing her search, presently she heard the pad of bare feet behind her and a shout made her turn. It was the elderly man, clad in a bath towel.

"Wait a minute!" he gasped. "Where's the fire?"

Circumstances Alter Cases

Guest—Waiter, have you real turtle soup here? I have never tasted it in my life.

Manager of Restaurant—Yes, sir; we have some, in that case.

Wonderful Age

"When I read about the marvels of electricity, it makes me stop and think"

"Imagine that! isn't it wonderful what electricity can do!"

Weather Too Uncertain

Inside or outside room, sir?

Inside, I reckon; looks like rain.

Diplomat

"I always have the last word in discussions with my wife."

"How do you manage it?"

"I say, 'Quite right, my dear.'"

Keeping the Record Straight

"Let's see," said the chatty man, "your brother went abroad on a fellowship, didn't he?"

"No," was the reply, "it was a cattleship."

Necessary Evil

So you desire to become my son-in-law?

Well, I, er, not exactly. Of course, if I marry your daughter, I er, ah, don't see how I can get out of it.

Relief

Mrs. Jones called up to say she couldn't meet you downtown this morning.

Well, that's a wait off my mind.

Sh-h

An Irishman in a Boston court was endeavoring to disprove that he had a brogue. The judge, listening to his statements, interrupted, saying:

"Pat, if you wish to deny your brogue, may I suggest that you put it in writing?"

A Likely Story

A spinster living in a London suburb was shocked at the language used by two men repairing telegraph wires close to her home. She wrote to the company on the matter, and the foreman was asked to report. This he did, in the following way:

"Me and Bill Fairweather were on this job. I was up the telegraph pole, and accidentally let the hot lead fall on Bill; it went down his neck. Then he said: 'You really must be more careful, Harry.'"

So Do We

"I admire Keats."

"It's a relief to meet a lady vot still likes children."

True to Form

"That man has made a fortune getting around pretty girls."

"I'll bet he's a gigolo."

"No, dearie, he's a girdle manufacturer."

Oh, Johnny

"Well, Johnny, how does it feel to be nine years old?"

"I'm in a tough spot, Auntie. I'm too old to cry, and too darned young to swear!"

Right Answer

Jones tried to make me believe that he's driven his car for five years and never paid a cent for repairs. Can you believe that?

I'll say I do. I made the repairs.

Pat and Mike

Hey, Pat, didn't the landlord say this was a feather bed?

Sure, and that's what he did say.

Well, change places with me. It's my turn to be on the feather.

Traveler's Lament

Joshua Brush, a traveling man
Who sailed the briny main,
Was Mister Brush in England,
And Senor Brush in Spain.
The Frenchmen called him Monsieur Brush,
But the Germans were his bane,
For they always called him Herr Brush,
Which filled his soul with pain.

Gott
WATER CAN
Gotkool
WATER CANS
& COOLERS
GOTT Water Cans are the practical way to keep drinking water cool for long periods, protected from impurities and always handy to the job. Snug fitting large removable top, strongly built to withstand rough usage. GOTT Water Coolers have extra large covers and a handy non-leaking push button faucet. Your Supply Store has them, get one today! . . . . . .
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Made in 1½, 3, 5, and 10 gallon sizes.
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Made in 3, 5, 8, 10, and 20 gallon sizes.
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WINFIELD, KANSAS
KEEP PURE DRINKING WATER ALWAYS HANDY

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Trinity Portland Cement Co.	—

U

*Union Wire Rope Corp.	—
Union Carbide & Carbon Corp.	—
*Unit Rig & Equipment Co.	—
*United States Rubber Co.	—
United States Steel Corp.	31
*Universal Atlas Cement Co.	—

V

*Vickers, Inc.	—

W

Warner & Swasey Co.	10
The Watson-Stillman Co.	—
*Waukesha Motor Co.	—
*Well Machinery & Supply Co.	—
*Westinghouse Electric & Manufacturing Co.	—
*Wheeling Machine Products Co.	—
*The Wheland Co.	—
*Wickwire Spencer Steel Co.	—
*J. H. Williams & Co.	—
*Wilson Manufacturing Co.	—
*Wilson Supply Co.	—
Witte Engine Works	—
*Worthington Pump & Machinery Corp.	—
Wyatt Metal & Boiler Works	—

Y

Youngstown Sheet & Tube Co.	—